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CHAMBERS'S

ENCYCLOPÆDIA

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William & Robert CHAMBERS'S

ENCYCLOPÆDIA

A DICTIONARY

OF

UNIVERSAL KNOWLEDGE

NEW EDITION

VOL. X.

SWASTIKA TO ZYRIANOVSK

AND INDEX

WILLIAM & ROBERT CHAMBERS, LIMITED
LONDON AND EDINBURGH
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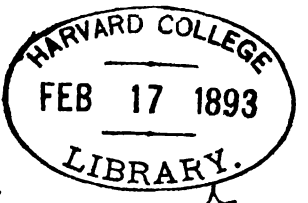

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EDITORIAL NOTE.

THE first volume of the new edition of CHAMBERS'S ENCYCLOPÆDIA was issued in March 1888; the work is now completed within less than five years by the issue of the tenth volume. It is not merely, as was promised, a thoroughly new edition, but is to all intents and purposes a new work; and the publishers and editor are confident that, whether regard be had to fullness, compactness, accuracy, proportion, systematic arrangement, or literary form, it greatly surpasses the former edition, and is the best book of its scope and kind extant. Nearly a thousand authors—many of them of the first eminence, and all specially qualified for their work—have contributed; and to them the reader is indebted for the authority, variety, interest, and readableness of the articles. He need but glance at the lists of principal articles prefixed to the successive volumes to realise how numerous and how eminent those contributors have been.

An encyclopædia is by no means, as has been frequently assumed ever since the name or the thing was known, a dry and formless catalogue of disjointed or chaotic facts, whose sole claim to existence lies in its being handy for reference and moderately correct. On the contrary, a well arranged encyclopædia is a microcosm, a conspectus of the universe, a more or less effective view of 'the proficience and advancement of learning divine and human,' to use Bacon's ambitious phrase. It is a stocktaking in almost every department of science; and should be even less remarkable for its multifariousness and fullness than for the proportion, interdependence, and due subordination of parts.

This systematic form, for which the editorial staff must mainly be held responsible, the editor believes he has in great measure secured; and he is glad heartily to thank his colleagues one and all for their unremitting, laborious, conscientious, and scholarly co-operation. Mr FRANCIS HINDES GROOME and Mr THOMAS DAVIDSON have from the outset had a share in almost every department of the editorial duties, besides contributing many and important articles from their own pens. The Rev. WILLIAM DUNDAS WALKER has throughout done admirable work both in writing and revising articles—as did also Mr JOHN T. BEALBY for a shorter period. Mr ROBERT COCHRANE has rendered invaluable service in the secretarial and other departments. At the commencement help which has been of lasting value was given by Mr WILLIAM INGLIS, a partner in the Firm, who died before the first volume was issued. His work has been continued by his successor, Mr ROBERT MOWAT, who has read the proofs and made many useful suggestions. The Rev. JAMES INGLIS has sustained the labour of preparing the Index; and the illustration of all the ten volumes—often from photographs by Messrs FRITH and Mr GAMBIER BOLTON—has been under the charge of Mr J. R. PAIRMAN. Some of the outside contributors have, in respect of the continuity of their work, been practically on the staff; thus Mr J. ARTHUR THOMSON has written almost all the articles on zoological subjects. Mr W. S. WASHBURN, of Messrs J. B. Lippincott Co., Philadelphia, has been very helpful in regard to the American articles. An editor's chief work is to edit; but besides revising all the articles, the editor has been one of his own most frequent contributors—mainly in the shorter articles and such as fell within his special competency.

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Over and above correction by authors and by the printer's readers, every article has been read in proof by him and at least two of his colleagues. In many cases moreover articles in proof have been submitted to specialists other than the writers; their courteous help has been already acknowledged in the lists of principal articles. A large number of the articles on towns and institutions have been most kindly revised by town-clerks or other officials.

Of those who projected and carried through the first edition (1859-68)—into whose labours we of the present edition have entered—the great majority are no longer with us. Dr WILLIAM CHAMBERS and Dr ROBERT CHAMBERS had passed away before this edition was undertaken by the Firm, then headed by Mr ROBERT CHAMBERS the Second, who, dying in 1888, left as representative of the old house his son Mr C. E. S. CHAMBERS. Dr FINDLATER, the first editor, had died in 1885; but of the hundred contributors to the first edition nearly twenty have also contributed to the second—of whom, alas! five have died during the publication of these volumes. Of other collaborateurs on this edition we have lost by death no less than ten since the work began.

Now that the days of the polyhistors are past, not merely the general reader but even the man of special learning may often find his account in referring to what is a compendium of many libraries; the most accomplished specialist in one department may find it useful to read the articles by brother specialists in other departments. But encyclopædists make no claim to omniscience or infallibility; and none can be so conscious as the editor of the inevitable shortcomings of a work treating '*de omni re scibili et quibusdam aliis*' and yet strictly limited to ten volumes not much larger than in the former edition. The necessity of keeping within the prescribed limits has been both a painful and laborious condition of the editor's work, and must be the apology for compression within short space of many articles well worthy to extend to much greater length. Still, from the very nature of the case, the encyclopædia can be only a guide, a preparation, a stepping-stone, a stimulus to further and fuller study elsewhere. The spirit was good in which Bartholomæus Anglicus concluded his *De Proprietatibus Rerum*, the 'Encyclopædia of the Middle Ages,' with words thus Englished by his translator:

> *'I make protestation in the end of this worke, as I did in the beginning, that in all 'that is in divers matters conteined in this worke, right little or naught have I set of mine 'owne, but I have followed veritie and truth, and also followed the wordes, meaning, and 'sences, and comments of holy Saints and of Philosophers; that the simple that may not 'for endlesse many bookes seeke and find all the properties of thinges . . . may heere find 'somewhat that he desireth. And that I have taken is simple and rude; but I think them 'good and profitable for me . . . and to other such as I am. Therefore I counsayle the 'simple that they dispise not nor scorne this simple and rude worke; when that they have 'perfect understanding and knowledge of this . . . then to understande and to have 'knowledge of greater, higher, and more subtill things. I counsell that they leave not to 'seeke and search the learning and doctrine of greater authors and doctors. And that I 'doe and leave on their owne avisement and wit if they will correct and amend that that 'is insufficientlie said, and then expediently to adde and put more thereto, as God giveth 'them grace and science. . . . .'*

DAVID PATRICK.

EDINBURGH, *Christmas* 1892.

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Among the more important articles in this Volume are the following:

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Talleyrand; Thiers	William Wallace.
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Tasmania	Sir E. N. C. Braddon, K.C.M.G., &c.
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The Publishers beg to tender their thanks, for revising articles, to the Dean of Worcester; the Agent-general for Western Australia; the town-clerks or other officials of Warrington, Warwick, West Bromwich, Whitby, Workington, Yarmouth; to Professor Zahn of Erlangen, for revising 'Tatian;' and to Mr D. L. Miller, for the materials of 'Tunkers.'

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Swastika. See SVASTIKA.

Swatow, a seaport of China which has been opened to foreign trade since 1869, stands at the mouth of the river Han, 225 miles E. of Canton, in the province of Khwang-tung. It is the seat of great sugar-refineries, and bean-cake and grass-cloth manufactures. Its trade has grown but slowly: in 1869 it reached a total of £4,800,000, in 1889 of £5,170,000, and in 1890 £6,400,000. The imports, which are valued at two-thirds of the total amount, consist principally of bean-cake and beans (yearly average, £948,000), cottons (£755,000), opium (£695,000), rice (£145,000), metals, hemp, silks and woollens, and wheat. Sugar (£1,093,500 yearly on an average) forms the chief item amongst the exports; besides it tobacco, cloth and nankeens, joss paper, grass-cloth (made from a kind of hemp fibre), and tea are sent abroad. Pop. 30,000.

Swaziland, a South African native state, lying on the west side of the Libomba Mountains, and forming geographically an intrusion into the east side of the South African Republic. It has an area of 6150 sq. m.; a pop. of 60,000 Swazis and (in 1892) about 1000 white men; and a trade valued at £70,000 through Natal, exclusive of what goes by way of Delagoa Bay. The independence of this little state was recognised by its powerful neighbours, the South African Republic and the British government, in 1884; but in 1890 it was agreed by all parties concerned that the white settlers, who are chiefly engaged in gold-mining, should be governed by a joint administration of the Boer and British governments. The Swazis, a Zulu-Kaffir race, smelt copper and iron, and are noted for their wood-carving.

Swearing, or PROFANE SWEARING, the habit of using the name or attributes of God in a light and familiar manner by way of asseveration or emphasis. It was specially condemned by the Mosaic law, was long punished by severe penalties, and is still an actionable offence in England (see below). By oaths are loosely understood many terms and phrases of a gross and obscene character, as well as those words the use of which specially implies profanity proper. Again, there is a legitimate use of imprecations and curses when intense hatred is to be expressed, and when it is justifiable. It is only taking the sacred name *in vain* that need be condemned, and we know how at my Uncle Toby's one oath 'the recording angel dropped a tear upon the word and blotted it out for ever.' It is hardly necessary to say how natural it is for weak men of limited vocabulary, under the pressure of excitement, to seek for artificial strength or verification by employing irrelevant words that carry with them ideas of gravity or strength. Seafaring men and persons in command generally often use such expressions to add weight to their words, and some apology may be found for them in the fact that the persons with whom they have usually to deal have been so accustomed to their use as not to be readily inclined to obedience without them. Again, other and more imaginative men, alike in England and America, from the days of Rabelais until now garnish their talk with oaths as a mere exercise of verbal ingenuity, or by way of off-set to their conversation.—'How now?' said Ponocrates, 'you swear, Friar John;' 'It is only,' said the monk, 'but to grace and adorn my speech; they are colours of a Ciceronian rhetoric.'

To call God to witness is a thing natural enough on occasions of grave asseveration, as in giving witness in courts of law and the like, and it has been from the beginning a custom to take oaths on things sacred or august, as the head of the emperor, the beard of the Prophet, the sword blade or hilt, and the gospels. Thomas Becket denounced John the Marshal of England for swearing on the *troparium*, a collection of versicles and sequences used in the service of the mass. We find oaths frequent enough among the Greeks and

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Romans: Pythagoras is said to have sworn by the number four; Zeno, by the caper; Socrates used mild oaths, as 'By the dog,' and Aristophanes tells of a time when no men swore by the gods, but all by birds. The Romans used 'Mehercule,' 'Medius Fidius,' 'Edepol,' 'Ecastor,' and 'Mecastor' (properly a woman's oath), &c. Brantôme tells us Louis XI. said 'Par la Pâque Dieu;' the oath of Francis I. was characteristic—'Foi de gentilhomme.' 'Ventre Saint-Gris,' again, was one of the Gascon oaths of Henry IV. of France, which he alternated with another favourite, 'Jarnidieu.' Many of the modern French oaths, as 'Parbleu' (*par Dieu*), 'Corbleu' (*corps de Dieu*), 'Ventrebleu,' and 'Sacrebleu,' are illustrations of a process of softening an oath by a deliberate disguise, like the old-fashioned 'Gad' and 'Egad,' the north country 'Dod' and ''Scush' (*God's curse*), and the older English ''Slight' (*God's light*), 'Od's fish'—the usual oath of Charles II., 'Zounds' (*God's wounds*), 'Od's bodikins,' and the American 'Darn.' Similarly in Italy, between the severe laws against profanity and blasphemy and the necessity of confession, forms like 'Per Dio' became in early times disguised as 'Per Dinci.' Indeed the Italians, especially in Tuscany, are extraordinarily rich in oaths, many strange and grotesque forms being in use, and the meanings of common forms being carefully differentiated. Mr Story tells us that 'Dio mio' is proper as an expression of sudden surprise, 'Madonna mia' of pity and sorrow, 'Per Christo' of hatred and revenge. Nothing on the Continent strikes an English ear more strangely than the familiar use of 'Dieu' in France and of such phrases as 'Herr Je' in Germany, and English reticence refuses to accept the over-subtle apology even of a Cardinal Newman (*Lect. on Certain Diffic.* ix.), that this variety and fertility in adjurations and invocations is merely because a Catholic populace has a greater insight into the unseen world than a Protestant. 'The Catholic's very jesting, and his very oaths, have been overruled,' says he, 'to create in him a habit of faith, girding round and protecting the supernatural principle.' But it is proper to explain that what James Howell calls 'this infandous custom of swearing' is to Continentals specially an English characteristic. Indeed Howell himself, after enumerating the performances of the German, the Italian, the Frenchman, the Spaniard, the Welshman, the Irishman, and the Scot, admits that 'for variety of oaths the English Roarers put down all.' Byron describes how Don Juan on his first arrival in England is rudely awakened from the innocent belief that 'their shibboleth "God damn"' is a usual salutation. Beaumarchais (*Le Mariage de Figaro*, iii. 5) says, 'Avec Goddam en Angleterre on ne manque de rien nulle part . . . les Anglais à la vérité ajoutent par-ci par-là quelques autres mots en conversant; mais il est bien aisé de voir que Goddam est le fond de la langue.' We hear this phrase as a synonym for Englishman even from the pure lips of Joan of Arc, and we certainly find the oath in the other Elizabethan dramatists, and in Shakespeare, but not in anything like its modern pre-eminence of importance. Still we find oaths enough of all shades of profanity in early English literature, and corresponding denunciations in the writings of preachers like Jeremy Taylor and Thomas Fuller, down to the days of that genial but true moralist, the *Spectator*. A few of the more common old English oaths—all in Shakespeare—were 'Bodikins,' 'By Cock and Pie' (*God* and the Romish service-book), 'Cock's passion,' 'By'r Lady,' 'Marry' (the Virgin *Mary*), 'By my halidom' (*holiness*), 'Od's me,' ''Sblood,' 'Gramercy,' 'By the rood' (the *Cross*), ''Shrew me.' Sir Thopas in the *Canterbury Tales* uses 'By ale and bread,' the dainty Madame Eglantine's greatest oath is only 'By St Eloy.' 'By Jove' and 'By George' are still heard; 'the dickens' (*devil*) already occurs in the *Merry Wives;* 'the deuce' is at least of the 17th century, although hardly Middle English, *pace* Professor Skeat; 'By the living Jingo' has been boldly described as Basque, and was rendered classic by the *Vicar of Wakefield;* Etheredge and Dryden write 'bloody drunk;' Swift, 'bloody cold' and 'bloody sick'—early examples of one of the most odious of modern vulgarisms; the Duke of Wellington's 'twopenny damn' (of which there is an attempted innocent explanation) almost died with him; Queen Elizabeth, James I., Lord Thurlow, Picton, and Lord Melbourne, all notorious swearers, were catholic in their choice of oaths. The prophecy of Bob Acres (*Rivals*, ii. 1), that 'damns have had their day,' has not yet entirely come true, although the reformation of manners has long since driven swearing from the quarter-deck, and a Squire Western is now more than a phenomenon. Swift's *Swearer's Bank* (Scott's *Swift*, vol. vii.) is a characteristic satire on the profanity of his day. It is computed by geographers, he begins, that there are two millions in this kingdom [Ireland], of which number there may be said to be a million of swearing souls. It is thought that there may be 5000 gentlemen, each with one oath a day at a shilling each, yielding an annual revenue of £91,250. All classes of citizens contribute to this revenue, the farmers, the commonality, the hundred pretty fellows in Dublin alone at fifty oaths a head daily, the oaths of a little Connaught fair themselves computed at 3000. Militia under arms are to be exempted, nor is any advantage to be taken of any man's swearing in the Four Courts, provided he is at hearing in the exchequer or has just paid an attorney's bill. As for its medicinal use to help the lungs to throw off any distilling humour, on certificate of a course of swearing granted by any physician a permit may be issued to the patient, but all other licenses, compositions, or indulgences whatever are prohibited.

The church ever denounced profane swearing, but was powerless to check the practice. St Chrysostom spent twenty homilies upon it, and St Augustine's judgment is summed up with unnecessary severity in the solemn passage, 'Non minus peccant qui blasphemant Christum regnantem in cœlis quam qui crucifixerunt ambulantem in terris.' For much of our popular swearing is little more than the mere habit of vocabulary, a sin only from the lips outward, as Bishop Lightfoot said of the habitual profanity of the colliers of his diocese. Again, where swearing is a professional custom it is scarce possible to exist without conforming, and after all words have in themselves no absolute but a relative meaning. 'Our armies swore terribly in Flanders' in my Uncle Toby's time, nor was the practice extinct till long after the great French wars. And have we not still our familiar proverb 'to swear like a trooper.' But swearing has disappeared from the parade-ground, though it still lingers in the barrack-room. 'To swear like a bargee,' however, is a proverb still justifiable by the facts—an atmosphere of oaths continues to hang heavy over our canals and rivers. We are told that Robert Burton at last could only be made to laugh by going down to the Bridgefoot in Oxford and hearing the bargemen scold and storm and swear.

The old forms of excommunication in ecclesiastical use supplied forms enough, and the specimen of the powers of Ernulphus given in *Tristram Shandy* certainly displays 'an orientality we cannot rise up to, a copiousness of invention, a possession of all the excellencies of a swearer

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which make it impossible to swear out of it.' The advantage of a theological vocabulary is seen further in Scott's story of the swearing-bout between a skipper and a broken-down minister, where the latter swore his antagonist dumb with a copiousness and variety he could not equal. In England the growth of Puritanism was marked by a series of attempts to stamp out swearing. In 1601 a measure for this end was introduced into the House of Commons, and one was carried in 1623. 'Not a man swears but pays his twelve pence,' says Cromwell proudly of his Ironsides. As early as 1606 swearing in plays had been forbidden, and even Ben Jonson himself narrowly escaped the £10 penalty. An act of 1645 in Scotland details the penalties to be inflicted, even on ministers of religion—it will be remembered that Barham recommends these not to go beyond 'zooks.' Shirley's play, *The Young Admiral* (1633), is especially noted as 'free from oaths, profaneness, and obsceneness.' When Davenant's *Wits* next year was presented to Sir Henry Herbert for license, the latter crossed out many expressions. Davenant appealed to the king, who directed the Master of the Revels to allow such words as 'Faith,' 'Death,' and ''Slight.' Sir Henry made the following entry in his office-book: 'The king is pleased to take "Faith," "Death," and "'Slight" for asseverations and no oaths, to which I do humbly submit as my master's judgment; but under favour conceive them to be oaths, and enter them here to declare my opinion and submission.' St Paul's Cathedral is supposed to have been built without an oath, the regulations of Sir Christopher Wren being so stringent, and this may be allowed to remain its most remarkable distinction.

Profane swearing, according to the law of England, is an offence for which the party may be convicted under an act of George II. by a justice of the peace according to a scale of penalties. A day labourer, common soldier, sailor, or seaman forfeits 1s. per oath; every other person under the degree of a gentleman, 2s.; and every person above the degree of a gentleman, 5s.; for a second offence, double these sums; for a third, treble, &c. If the cursing take place in presence of a justice of the peace, the latter may convict the swearer then and there, without further process or evidence; and in all cases a constable may apprehend a profane swearer, and carry him before a justice. On one occasion a man swore a volley of oaths, twenty times repeating the oath, and the justices fined him 2s. for each repetition, making in all £2, and this was held a proper conviction. It seems that this act does not apply to women; but there are provisions of a more general character in several modern police acts which impose a penalty for using profane or obscene language in public places. The justices of the peace in Scotland have a similar jurisdiction, to convict of profane swearing, and fine according to the rank of the party.

See articles on BLASPHEMY and OATH; also Julian Sharman, A *Cursory History of Swearing* (1884).

Sweat (A.S. *swát*), the moisture exuded by the skin, in which about 2 per cent. of solid matters is present, consisting of salt; formic, acetic, butyric, and other fatty acids; neutral fats; and cholesterin. The manner of its excretion, its uses, &c. are considered at Skin (q.v.).

Sweating Sickness, an extremely fatal epidemical disorder, which ravaged Europe, and especially England, in the 15th and 16th centuries. It derives its name 'because it did most stand in sweating from the beginning until the endyng,' and, 'because it first beganne in Englande, it was named in other countries the Englishe sweat.' It first appeared in London in September 1485, shortly after the entry of Henry VII. with the army which had won the battle of Bosworth Field on August 22. It was a violent inflammatory fever which, after a short rigor, prostrated the powers as with a blow, and, amidst painful oppression at the stomach, headache, and lethargic stupor, suffused the whole body with a fetid perspiration. All this took place in the course of a few hours, and the crisis was always over within the space of a day and night. The internal heat which the patient suffered was intolerable, yet every refrigerant was certain death. 'Scarce one amongst a hundred that sickened did escape with life' (Holinshed)—a statement which, while probably greatly exaggerated, illustrates the dread with which the malady came to be regarded. Two lord mayors of London and four aldermen died within one week; and the disease for the most part seized as its victims robust and vigorous men. It lasted in London from the 21st of September to the end of October, during which short period 'many thousands' died from it. The physicians could do little or nothing to combat the disease, which at length was swept away from England by a violent tempest on New-year's Day. In the summer of 1508 it reappeared in London, and in July 1517 it again broke out in London in a most virulent form, carrying off some of those who were seized by it within four hours. It seems chiefly to have attacked those in the upper classes or in comfortable circumstances. In many towns a third or even a half of the inhabitants are said to have been swept away, again probably an overstatement. On this occasion the epidemic lasted about four months. In May 1528—the year in which the French army before Naples was destroyed by pestilence, and in which the putrid fever known as *Trousse-galant* decimated the youth in France—the sweating sickness again broke out in the metropolis, spread rapidly over the whole kingdom, 'and fourteen months later brought a scene of horror upon all the nations of northern Europe, scarcely equalled in any other epidemic.' How many lives were lost in this epidemic, which has been called by some historians *the great mortality*, is unknown; the fact that King Henry VIII. left London, and endeavoured to avoid the disease by continually travelling, shows the general feeling of alarm that existed. We hear of it at Calais in the same year, but nowhere else out of England. In the following summer, having apparently died out in England, it appeared in Germany, first at Hamburg, where it is recorded that 8000 persons died of it, and shortly after at Lübeck, Stettin, Augsburg, Cologne, Strasburg, Hanover, &c. In September it broke out in the Netherlands, Denmark, Sweden, and Norway, whence it penetrated into Lithuania, Poland, and Livonia; but after three months it had entirely disappeared from all these countries. For three-and-twenty years the sweating sickness totally disappeared, when for the last time (March or April 1551) it burst forth in Shrewsbury, spread rapidly over the whole of England, but disappeared by the end of September. The deaths were so numerous that one historian (Stow) states that the disorder caused a *depopulation* of the kingdom. The very remarkable observation was made in this year that the sweating sickness uniformly spared foreigners in England, and on the other hand followed the English into foreign countries. The immoderate use of beer amongst the English was considered by many as the principal reason why the sweating sickness was confined to them. Since 1551 the disease has never appeared as it did then and at earlier periods. Its nearest ally is Sudamina (q.v.), or miliary eruption, which has appeared in frequent, but usually limited, epidemics in France, Italy, and Germany (still called

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there 'the English sweat'), during the 18th and 19th centuries, sometimes, as in the dept. of Vienna in 1887, in so severe and even fatal a form as to suggest the older epidemic in miniature.

See Dr John Caius, *A Boke against the Sweatyng Sicknesse* (1552); Hecker, *Epidemics of the Middle Ages* (Syd. Soc. Trans.); Hirsch, *Geographical and Historical Pathology* (New Syd. Soc. Trans., vol. i. p. 82); and Creighton, *History of Epidemics in Britain* (1891).

Sweating System. This subject was first brought prominently before the public in 1847–48 by the *Morning Chronicle* newspaper, and subsequently by a pamphlet (*Cheap Clothes and Nasty*) and a novel (*Alton Locke*), both from the pen of Charles Kingsley. It was shown that some of the journeymen tailors, instead of doing the work on the premises of their masters, had commenced the practice of taking the garments to their own houses, where they called in the assistance of their families and of other persons. This system was called 'the Sweating (i.e. over-working) System,' because the persons employed under it worked harder than the public opinion of the men in the tailoring trade considered reasonable; just as an unconscionably industrious schoolboy is reproached by his fellows for 'swatting.' The term, 'the sweating system,' soon began to be applied to more or less analogous practices in other trades, and generally to all practices objected to by the workers. 'Sweating' is now used to denote unfair treatment of any kind, without reference to any particular system of employment. But the sweating system is still chiefly applied to cases in which work is sub-contracted—i.e. in which a principal employer, instead of having the work done by men in his own employment, hands it over to a 'middleman,' who gets it done with the assistance of persons engaged by him for the purpose. In some cases the sub-contractor and his employees work on the premises of the principal employer, this type of middleman being usually called a 'piece-master.' But, as a rule, when the sweating system is spoken of reference is made to the 'sweating-master' or 'garret-master,' who employs his workpeople in his own 'sweating-den.' In February 1888 a select committee of the House of Lords was appointed to examine into the sweating system in East London, the reference being afterwards extended to cover the United Kingdom. The industries investigated included the tailoring trade, shirt-making, mantle-making, furriery, boot-making, cabinet-making and upholstery, chain and nail making, the cutlery and hardware trades, and also dock labour and government contracts. The final Report of this committee, published in April 1890, states that 'the earnings of the lowest class of workers are barely sufficient to sustain existence. The hours of labour are such as to make the lives of the workers periods of almost ceaseless toil, hard and often unhealthy. The sanitary conditions under which the work is conducted are not only injurious to the health of the persons employed, but are dangerous to the public, especially in the case of the trades concerned in making clothes, as infectious diseases are spread by the sale of garments made in rooms inhabited by persons suffering from smallpox and other diseases. . . . As a rule, however, it must be remembered that the observations made in respect to sweating apply, in the main, to unskilled or only partially skilled workers, as the thoroughly skilled workers can almost always obtain adequate wages.' While blaming employers as 'regardless of the moral obligations which attach to capital when they take contracts to supply articles and know nothing of the condition of the workers by whom such articles are made, leaving to a sub-contractor the duty of selecting the workers,' the committee declare that 'the middleman is the consequence, not the cause of the evil; the instrument, not the hand which gives motion to the instrument, which does the mischief. Moreover, the middleman is found to be absent in many cases in which the evils complained of abound.'

On the other hand, the middleman or sub-contractor is certainly present in very numerous instances in which the evils of sweating are absent. Thus, in the cotton trade, the 'minders' employ their own 'piecers;' in the iron trade a great number of operations are entrusted to sub-contractors ('puddlers' employing their own 'underhands,' 'hammermen' employing their own assistants, &c.); sub-contract is widely prevalent in mines and quarries, in the ship-building and in numerous other industries, but is in these cases unaccompanied by serious oppression of the workers, and is not called the sweating system. The sub-contractor usually himself performs a part, generally the most difficult part, of the work, and in all cases renders useful services by organising and directing the labour of his subordinates; while the remuneration which he receives is, as a rule, by no means out of proportion to the importance of the duties which he fulfils. But, since the amount of his remuneration depends directly upon his getting his employees to do a *maximum* of work for a *minimum* of pay, the sub-contractor, especially if his workpeople are deficient in skill or incompetent to combine against oppression, tends to become a greedy and exacting task-master.

Before the final Report of the Lords' Committee was issued the sweating system had been abolished in the metropolitan docks and in the greater part of the London boot trade by successful strikes. Since its publication most of the principal legislative provisions recommended in this report have been made. See the Factory and Workshop Act, 1891, and the Public Health (London) Act, 1891. The duty of the nation to secure that those who do its work shall be fairly treated has been formally recognised by parliament, and is carried out by the government, which not only interferes to obtain for the workpeople employed by its contractors the full current rate of wages, but has in a recent important contract provided that the contractor, unless expressly authorised, shall not either sub-contract the work 'or employ any taskmen'—i.e. piece-master foremen. Many public bodies (including the London County Council and the municipal authorities of Birmingham, Gloucester, Leeds, Leicester, Liverpool, Manchester, Middlesborough, Nottingham, Salford, Sheffield, Sunderland, and West Ham) now require their contractors to pay full current wages; and in numerous cases contractors engaged on public works are prevented from sub-contracting, except so far as sub-contract is usual and necessary.

Further details in respect to the sweating system will be found in three Reports by Mr J. Burnett, Labour Correspondent of the Board of Trade: (*a*) on the Sweating System at the East End of London; (*b*) on the Sweating System in Leeds; and (*c*) on the Nail Makers and Small Chain Makers in South Staffordshire and East Worcestershire (1887, 331; 1888, c. 5513; 1888, 385, Eyre & Spottiswoode); the five Reports, Minutes of Evidence, Appendices, and Index of the Lords' Committee on the Sweating System; Booth, *Labour and Life of the People* (especially vol. i.); and *Methods of Industrial Remuneration*, by the present writer, David Schloss. See also the article IMMIGRATION.

Sweden (*Sverige*), a kingdom of northern Europe, occupying the eastern side of the Scandinavian peninsula. The Skager Rack and the Cattegat touch its south-western shores. In the far north-east it is separated from (Russian) Finland

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by the river Torneå and its affluent, the Muonio. Almost the whole of the eastern side is washed by the Gulf of Bothnia and the Baltic Sea; this last also beats against its short southern coast. The longest line, from north to south, measures little short of 1000 miles, the greatest breadth 300; the area is 170,644 sq. m.; the coast-line is about 1550 miles. Besides the skerry-islands (see below) Sweden owns Gothland (q.v.) and Œland (q.v.).

Physical Features.—The country may be generally described as a broad plain sloping south-eastwards from the Kjölen Mountains (see NORWAY) to the Baltic. The only mountainous districts adjoin Norway; the peaks sink in altitude from 7000 feet in the north to 3800 in 61° 30′ N. lat. Immediately south of this point a subsidiary chain strikes off to the south-east, and, threading the lake-region of central Sweden, swells out beyond into a tableland with a mean elevation of 850 feet and maximum of 1240 feet. Fully two-thirds of the entire surface lies lower than 800 feet, and one-third lower than 300 feet, above sea-level.

By far the greater portion of Sweden is built up of crystalline gneisses and granite of the Azoic era, and of limestones, sandstones, clay-slates, and other slates of the Lower Silurian epoch. The non-fossiliferous formations, which fill the western, northern, and large portions of the southern parts of the country, lie as a rule close to the surface or are actually exposed. The Silurian strata are spread out in broad thin sheets, regularly disposed, but broken by large islands of granite, gneiss, eruptive trap (diabase), porphyry, greenstone. The Triassic and Cretaceous systems have just touched the southern end of the country. During the Glacial epoch the whole of Sweden was covered with ice. Its melting accounts for extensive deposits of glacial sand, clay, and gravel, as well as for the gigantic boulders and erratic blocks with which several districts are plentifully strewn, and the long narrow ridges of smooth stones, called *åsar*, that cross the country for many miles in a south or south-easterly direction. The eastern or Bothnian coast, like the western coast of Norway, is gradually rising; whilst the coast of Scania, in the extreme south, tends on the whole to subside. The islands of the skerry-fence (*Skärgård*) are nearly all small in size, low, bare of vegetation, and polished by the sea.

The climate of Sweden is continental in the north, along the Norwegian frontier, and on the southern plateau; the regions that border on the sea are more maritime. Yet both summer and winter, in all parts alike, are liable to considerable fluctuations from year to year. The difference between the winter and summer temperatures is of course much greater in the continental parts; for instance, in the extreme north as much as 49° F., whereas at Lund in the south it does not, as a rule, exceed 30°. The lakes in the colder (continental) districts of the north are ice-bound for some 220 days in the year; in the south for only about 90 days. The rainfall is greatest on the coast of the Cattegat (30 inches yearly), and decreases from west to east, and from south to north, being only 16 inches yearly in Norrland. The south-east corner is, however, exceptionally dry (17 inches).

Sweden is separated politically and geographically into three great divisions—Norrland, Svealand, and Gothland.

Norrland in the north is a region of vast and lonely forests and short, rapid mountain-streams. These torrents, none of them 300 miles long, reach the Gulf of Bothnia along narrow parallel valleys running to the south-east; as they drop from level to level they form cascades and waterfalls, some of remarkable grandeur. Many of the valleys are filled for many miles with ribbon-like lakes, some of great size; whilst their slopes, and the ridges that lie between them, are clothed with dense forests of pine, fir, and birch, with wild berry bushes and similar low shrubs growing in between the trees and around the moss-carpeted blocks of granite and porphyry. Besides the Lapps with their reindeer herds, and the Swedish wood-cutters and miners, the only denizens of these forest tracts are wild animals (reindeer, bears, wolves, lynxes, gluttons, foxes, lemmings), birds of prey (hawks, eagles, falcons, owls), hares, and game birds (ptarmigan, blackcock, heath-cock, hazel-grouse, snipe). The innumerable aquatic birds and the gnats of Lapland must not be forgotten. Numerous little seaports, where the lumber, floated down the streams, is cut up, and the iron ore from Gellivara and other mines is melted, nestle at the mouths of the rivers. This division is very rich in mineral resources, but iron ore is almost the only one that is extracted. Norrland is crossed by the most northerly railway in Europe (see LULEÅ).

The central division of Svealand, or Sweden proper, is a region of big lakes, and contains most of the mines. Lakes occupy nearly 14,000 sq. m., or 8·2 per cent. of the total area; but in Svealand several of the largest, as Vener, Vetter, Hjelmar, Mälar, are grouped together. Lake Mälar bears on its bosom a vast number (1300) of islands, many of them beautifully wooded, with royal palaces or noblemen's castles gleaming through the trees. Its shores too are studded with prosperous towns, castles, palaces, and factories. These great sheets of water are connected together by rivers and navigable canals, and by the same means have communication with the Baltic on the one side and with the Cattegat on the other. In spite of the fact that several rivers pour their floods into these lakes, a process of slow desiccation is going on throughout the region. Indeed the waters of Lake Mälar are at so low an elevation that at certain seasons there is an inflow from the Baltic. There is a pretty large area of forest in central Sweden, especially around the reed-fringed lakes. The firs of these districts are highly prized for ships' masts. Svealand possesses almost inexhaustible stores of iron and copper, and in less quantities silver, manganese, nickel, zinc, cobalt, and others.

Gothland, the southern division, contains a much higher proportion of cultivated land than either Norrland or Svealand. Wide plains stretch from the lakes to the Cattegat, and these as well as the southern coast provinces are all under agriculture. The rivers are short; the most important is the Göta, which, after forming the picturesque Trollhätta Falls, pours the waters of Lake Vener into the Cattegat at Gothenburg. Iron occurs in certain districts: Mount Taberg, for instance, the culminating point of the plateau, near the southern end of Lake Vetter, is a solid mass of magnetic iron ore. In Scania some 10,000 tons of coal are extracted annually, and large quantities of turf are dug. Turf moors cover fully 9 per cent. of the area of the country.

Population.—Since the middle of the 18th century the population has increased at a steady, though not very rapid, rate. In 1750 it numbered 1,785,727; in 1800 it was 2,347,303; in 1850, 3,482,541. The figures for 1880 and 1890 are given in the subjoined table (with the areas). By nationality the people are all Swedes, except some 17,000 Finns, 6000 Lapps, and 18,000 foreigners. The greater part of the people live in rural districts, only 20 per cent. being counted as 'townsfolk.' In 1890 there were eight towns whose population exceeded 20,000—Stockholm (q.v.), Gothenburg (104,657), Malmö (48,504), Norrköping (32,826), Gefle (23,484), Upsala (21,511),

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Caltscrona (20,613), Helsingborg (20,410), and eleven more exceeded 10,000. Between 23,500 and 50,700 persons emigrate every year, nine-tenths of them going to the United States.

Provinces (läns).	Area in sq. m.	Pop. (1880).	Pop. (1890).
GOTHLAND—			
Malmöhus	1,847	349,810	368,820
Kristianstad	2,506	230,619	221,697
Blekinge	1,164	137,477	142,606
Halland	1,899	135,299	136,560
Gothenburg and Bohus	1,952	261,114	297,780
Kronoberg	3,840	169,736	160,389
Calmar	4,488	245,105	232,848
Jönköping	4,489	196,271	193,708
Elfsborg	4,947	288,947	275,795
Skaraborg	3,282	257,942	247,075
Östergötland	4,271	267,188	266,615
Gothland (island)	1,203	54,668	51,389
SVEALAND—			
Stockholm (city)	13	168,775	246,154
Stockholm (län)	3,008	147,021	152,715
Upsala	2,052	111,019	121,097
Södermanland	2,680	147,186	154,989
Vestmanland (Westerås)	2,622	123,491	137,458
Örebro	3,502	182,263	182,556
Kopparberg	11,418	190,133	197,452
Vermland	7,344	268,417	253,328
NORRLAND—			
Gefleborg	7,417	178,728	206,924
Jemtland	19,598	83,628	100,455
Vesternorrland	9,517	169,195	208,758
Vesterbotten	21,986	106,485	122,784
Norrbotten	40,308	90,761	104,788
Lake Vener	2,149	..	..
" Vetter	733	..	..
" Mälar	449	..	..
" Hjelmar	185	..	..
Total	170,664	4,565,668	4,784,675

The state religion is that of the Lutheran Church, ruled by twelve bishops, of whom the Bishop of Upsala ranks as primate. Except about 22,000 persons, all the population belong to the national church; but religious confession is perfectly free to every man. In the matter of education Sweden occupies an honourable position amongst the countries of Europe. Primary education is compulsory but free, and there is an excellent system of elementary schools. The illiteracy, taking the country over, is not more than ·27 per cent. Various grades of secondary education are provided in more than 100 schools. Besides normal schools, schools of navigation, and technical schools, there are military, naval, artillery, veterinary, mining, agricultural, and other academies. The highest branches are provided for by the Medical Institution of Stockholm (330 pupils) and by the universities of Upsala (1880 students) and Lund (810). The percentage of illegitimate births has gone on steadily increasing all through the 19th century, from 6·14 in 1801 to 10 per cent. in 1890. The asylums contain about 11,500 idiots and insane, 4800 deaf-mutes, and 3700 blind. In the year 1888 1,031,250 savings-banks investors owned a total of £14,405,342, or an average of £13, 19s. 4½d. each. About 5⅛ per cent. of the population are recipients of poor relief.

Occupations.—More than one-half of the population are dependent on agriculture and its associated callings. Ninety-nine per cent. of the farms are less than 240 acres in size, and 84½ per cent. of the total do not exceed 25 acres. Between 7 and 8 per cent. only of the entire area is under cultivation, though in addition 4 per cent. is laid down as meadows. The principal crops are potatoes, oats, rye (of which the ordinary bread of the peasantry is made), barley, and wheat, beets for sugar, and roots for fodder. Gardening and fruit cultivation are somewhat neglected. There is comparatively little poultry. Some attention is given to the breeding of cattle and sheep, and both classes of animal are exported. Butter, upon the preparation of which great pains and skill are now expended, forms one of the largest items of the national exports.

The mines give employment to 34,000 persons, of whom more than 29,000 are engaged in extracting iron, and smelting and working it. In 1889 the iron-mines, which numbered 517, produced an aggregate of 2,009,380 tons. In the same year 123 other mines yielded 20,800 tons of copper, 8650 tons of manganese, 5900 tons of zinc, 700 tons of nickel, 270 tons of cobalt, and 13,000 oz. of silver.

About 40 per cent. of the aggregate surface is forest, and of this again 60 per cent. is in Norrland. Four-fifths of the forest area is private property. Only one-twelfth of the timber cut every year in Sweden is sent abroad; the rest is used in the ironworks, and metallurgical and other industrial establishments. About one-half of the quantity exported goes to Great Britain, chiefly in the form of pit-props.

The industries of Sweden have grown very rapidly since the middle of the 19th century. Between 80,000 and 90,000 persons, of whom one-fourth are women, are employed in the various industrial callings; and the year's results average the grand total of £11,600,000. The most important branches are ironworks, foundries, and so forth (220 establishments yielding an annual value of £1,513,400), sugar-refineries (£1,432,000), cotton-spinning and weaving (£1,350,500), breweries (£688,000), tobacco-factories (£594,000), paper-mills (£505,600), clothing-factories (£500,000), match-factories, tanneries, papier-maché works, brickworks, distilleries, glass and porcelain works, chemical works, and woollen-yarn factories. The old domestic industries—the spinning and weaving of linen and cotton—still survive in Angermanland (Vesternorrland) and Elfsborg.

The inhabitants of the skerry-islands and of the coast-lands are mostly fishermen. Herring and sprats are caught off the southern coast; salmon, eels, flounders, mackerel, haddock, and cod are taken off the east coast. The fisheries are worth nearly half a million sterling annually.

Sweden possesses a commercial marine of 1400 vessels of half a million tons burden. The foreign trade of the country averages annually £18,206,000 for imports and £14,291,000 for exports; the corresponding totals in 1870 were £7,500,000 and £5,000,000. The imports from Great Britain average £5,152,600, and the exports to the same country £7,071,000, though both amounts increase at a rapid rate. The most important articles of import are textiles (£5,739,800 in 1889), groceries (£3,331,600), minerals and metals (£2,731,000), machinery (£1,843,000), grain and flour (£1,628,000), hair, hides, horn, &c. (£1,207,500), and animals and animal foods (£880,000). Of the exports timber is by a long way the most important: in 1889 it was valued at £7,462,000. Next come minerals and metals, chiefly iron and steel (£2,442,400 in 1889); animal foods and animals (£2,270,326), more than one-half of the total for butter; grain and flour (£998,000), paper (£911,700), and textiles. Great Britain takes nearly half the minerals, nearly all the butter, and one-half of the grain and flour, and sends back coal (£906,000), iron, machinery, and textiles.

Government.—The executive power is vested in the hereditary king. He is advised by a council of ten members, who are responsible to the parliament. Seven of these preside one each over seven public departments (justice, foreign affairs, interior, finance, war, navy, and ecclesiastical affairs). The king shares the legislative power with the parliament (*riksdag*), though he possesses the right of initiative and of veto. There are two houses, which enjoy equal powers, but as a rule sit and vote separately. The members of the first house

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(147) are elected by the provincial councils and the municipal councils of certain large towns, one for every 30,000 inhabitants; they sit for nine years, and receive no salary. The members of the second house (228) are returned, by direct or indirect ballot as the electors themselves determine, one for every rural district that has less than 40,000 inhabitants, two for every rural district whose population exceeds that number, and one for every 10,000 in the towns; they are paid £66 each for each session. Every elector is eligible to sit in the second house of parliament. The twenty-four provinces and the city of Stockholm are each administered by a governor and a provincial council. The communes (parishes and towns) enjoy a liberal measure of self-government through their own local councils.

Justice is administered in the towns by the municipal magistrates and in each rural district by a judge appointed by the king acting with seven to twelve (elected) local assessors, whose verdict, if unanimous, overturns the decision of the judge. Press offences alone are tried by jury. There are three courts of appeal, in Stockholm, Jönköping, and Kristianstad, besides the Royal Supreme Court of Stockholm, with sixteen judges appointed by the king.

The military forces include a standing army and a militia. The former consists of (1) men who are enlisted and remain with the colours two to six years, and (2) a class (*indelta*) who receive a free cottage and annual pay, but are under arms for only about one month in the year. The militia embraces all the males who are liable to conscription; they serve from their twenty-first to their thirty-third year, but are only called up for exercise for some three weeks in autumn. The militia of Gothland may not be employed out of that island. The regular army numbers about 40,000 men, the militia 173,600. In addition there are 17,000 men enrolled in free volunteer or rifle societies. The navy is made up of sixteen ironclads and gunboats, forty unarmoured steam-vessels and torpedo boats, and six training (sailing) vessels. The naval service employs 50,000 men in all.

Finance.—The national accounts were balanced at £5,275,000 in 1891; and in the same year the national debt, incurred almost wholly for railways, reached the aggregate of £14,417,000.

The weights and measures and the coinage are the same as those of Norway (q. v.).

See A. Hammar, *Historiskt, geografiskt, och statistiskt Lexicon öfver Sverige* (8 vols. 1859–70); Hojer, *Konungariket Sverige* (1875–83); *Statistiskt Tidskrift* (1890 and 1891). In English see W. W. Thomas, *Sweden and the Swedes* (1892), and books of travel by Du Chaillu and Vincent, quoted under NORWAY.

History.—The earliest inhabitants of Sweden were in all probability Lapps or kindred Finnish tribes. The ancestors of the modern Swedes seem to have crossed over to the southern parts of Sweden during the stone age, according to Montelius some time before 1500 B.C. They drove the aborigines before them into the forests of the north and settled in their lands. At the dawn of the historic period Sweden was occupied by two Teutonic races, the Goths in the extreme south (Gothland) and the Swedes (Svea) in the lake-region (Svealand). Their manners and customs were the same; they spoke dialects almost identical; and their kings, elected by the freemen of the tribes, recognised as their common supreme head the priest-king of the great temple of Wodan at Sigtuna on Lake Mälar (but at Upsala from the tenth year of the Christian era). These priest-kings ruled for more than one thousand years from the Christian era. The first dynasty was that of the Ynglings; the last king of which, Ingjald Illrede (died 623), perished amid efforts to reduce the minor kings to the position of vassal princes. The next dynasty, that of the Skjoldungs, was founded by Ivar Vidfadme (died 647), a mighty conqueror. The most memorable of his successors were the famous Viking kings Harald Hildetand (died 735), Ragnar Lodbrok (794) Björn Jernsida (804), and Olaf Skatkonung (1026). During this long period the Swedes were in the countries round the Baltic what the Danes and Norsemen were on the shores of the North Sea (see NORTHMEN). In the 9th century, however, Scania was conquered by the Danes; and, except for certain short periods, it remained Danish down to the 17th century. Christianity was first preached in Sweden by Ansgar (q. v.) in the 9th century. From the middle of the ensuing century, for fully two hundred years, the Swedes, who clung fanatically to their heathen faith, and the Goths, who, nominally at least, professed Christianity, were generally arrayed in hostile camps. And this in spite of the fact, or rather in great part because of the fact, that an arrangement was come to by which each race should alternately elect the supreme pontiff-king at Upsala. Nor did the enmity cease after the Swedes became converted to Christianity under St Erik (IX.), whose religious zeal spurred him on to conquer great part of Finland (1155–60), a country that remained an appanage of the Swedish crown for 650 years. For the next century the Goths and Swedes had separate kings; and the clergy turned the ceaseless strife that ensued to their own account. Earl Birger, a man of great ability and conqueror of the rest of Finland, was the real ruler of the country during the reign of Erik XI. (died 1250), the last prince of the Swedish dynasty, as well as during the reign of his own son Waldemar, who was elected—the first of the Folkung kings—to succeed Erik. From the accession of Waldemar the animosities of the Swedes and Goths began to subside, and they gradually melted into one nation.

In the meantime, however, a new source of internal discord had grown up: the incessant wars had fostered the growth of a strong and ambitious nobility, who, with their natural allies, the higher ecclesiastics, not only treated the peasantry with great oppression, and even cruelty, but often either warred upon their king or made him little better than a puppet in their hands. King Magnus I. (1279–90), after deposing and imprisoning his incapable brother Waldemar, governed vigorously, and on the whole justly; he promoted the interests of all classes of his subjects and taught them to respect the law. As his son Birger (1290–1319) was only eleven years of age when he was placed on the throne, the reins of government fell into the wise and able hands of Torkel Knutsson, who added considerably to the territory of Finland and at home simplified the laws. But at length the king, instigated thereto by his brothers, committed a judicial murder upon Knutsson, and began to act arbitrarily. The patriotic party rallied round Mats Ketilmundsson, who guided his country to prosperity through the remaining year or two of Birger's reign and down to his own death in the seventeenth year of the reign of Birger's nephew Magnus II. (1319–63). This sovereign suffered himself to be influenced by unworthy favourites, who involved him in profitless wars abroad and led him into odious tyranny at home. In the end his subjects deposed him and conferred the crown upon his nephew Albert of Mecklenburg (1363–97). But Albert was equally unfitted to govern the turbulent nobles of Sweden; he surrounded himself with German courtiers and soldiers, and in order to support them raised revenues by unjust means, till at length the men whose ambitions he slighted offered the crown (1389) to Margaret (q. v.) of

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Denmark, wife of Haco of Norway. This caused strife again; but by the union of Calmar (1397) and the accession of Margaret's grandnephew Eric XIII. the crowns of the three Scandinavian kingdoms became united on one royal head.

During the greater part of the 13th and 14th centuries Sweden was torn by almost constant internal conflicts. Her kings were grasping of power, sometimes incapable, generally tyrannical, and often cruel. Her nobles and ecclesiastics were fierce, turbulent, and unrefined; her people ignorant and rude. Agriculture was much neglected; industry there was none; trade was monopolised by the Hanseatic merchants; literature, learning, and culture scarcely existed at all.

The Swedes' acquiescence in the union of Calmar was, however, little more than a matter of form. In their hearts all were hostile to it, and they could only be kept tolerably quiet so long as they were governed by native viceroys. Even them they frequently forced to take up arms against the Danes, and many bloody battles were fought; for the king of Denmark had a strong party amongst the Swedish nobles and higher ecclesiastics, whilst the people (peasantry) and certain of the nobles were enthusiastically national. The chief events of the long contest, which lasted until 1524, may be summarily related. In 1434 the peasants of Dalecarlia, the most patriotic and liberty-loving in the country, rose in revolt under a clever mine-owner, Engelbrechtsson. They were quieted by the appointment of Karl Knudson, a Swedish noble, as viceroy of Sweden, to govern in co-operation with Engelbrechtsson. On the death of King Erik's successor (Christopher), in 1448, Knudson was crowned king as Charles VIII. After reigning nine years he was driven out of the country by Christian I. of Denmark, assisted by Archbishop Bengtsson; but he returned in 1467 and reigned till his death in 1470. During the next thirty-three years Sweden was ruled, in an able and enlightened manner, by Knudson's nephew Sten Sture (q. v.). He was succeeded by his nephew Svante Sture (1503–12), and Svante by *his* son Sten Sture the Younger (1512–20). This ruler, as patriotic and able as his predecessors, was mortally wounded in battle with Christian II. of Denmark. That savage monarch, on 8th November 1520, for the purpose of striking terror into the hearts of the Swedish people, caused ninety-four persons, mostly of noble rank, to be massacred at Stockholm ('the Blood-bath'), and followed up this atrocity by doing to death throughout the country fully five hundred more of the influential among the national party. These deeds roused the Dalecarlians to action: putting themselves under the leadership of Gustavus (q. v.) Vasa, they drove the hated oppressors out of the country, crowned Gustavus king (1523), and tore (1524) to shreds the union of Calmar. The most momentous event in the reign of this the ablest prince who had yet ruled over the Swedes was the adoption of the Reformed doctrines, principally through the exertions of Olaus and Laurentius Petri (q. v.) and the deliberate policy of Gustavus, who in reforming the church took care that the clergy did not make themselves too powerful.

Gustavus so endeared himself to his subjects that they declared (1544) that the throne, instead of being elective as hitherto, should be hereditary in the House of Vasa. Accordingly on his death the crown was given to his son Eric XIV. (1560). In a reign of eight years this prince did many foolish things, and even some arbitrary and cruel acts; he was at length deposed by his brother John III. John, without openly breaking with the Protestant Church, warmly countenanced the Jesuits in their attempts to recover Sweden for the Roman see. His son Sigismund, who had been chosen king of Poland in 1587, and assumed the Swedish crown in 1592, pursued the same policy, but in a more undisguised and resolute manner. The Protestant party, however, rallying round Sigismund's uncle, made (1600) him King Charles IX. in his nephew's stead. Charles re-established the Lutheran creed, curtailed the privileges of the nobility, fostered mining, laid out seaports, and made the weight of his influence felt in Russia and Germany. His successor was his illustrious son Gustavus (q. v.) Adolphus (1611–32). After his heroic death at Lützen the crown passed to his daughter Christina (q. v.), though for some time the real ruler was the great Oxenstierna (q. v.). By the acquisition, through the treaty of Westphalia (1648), of the ecclesiastical domains of Bremen and Verden, and the greater part of Pomerania, Sweden became a member of the empire. Further, a war with Denmark brought to the Swedish crown certain of the Baltic islands and the three southern provinces of Sweden (Scania). But in 1654 Christina resigned the crown to her cousin Charles (X.), Palgrave of Zweibrücken. Having crushed his Polish rival of the House of Sigismund in a terrible battle near Warsaw (1656), this king finally expelled the Danes from the Swedish continent. The accession of his youthful son Charles XI. in 1660 was signalised by an agreement with the Polish branch, who not only abandoned their claim to the Swedish crown, but gave up Livonia and Esthonia. In the course of an ill-advised war against Denmark and Brandenburg combined the Swedes suffered several military disasters (notably at Fehrbellin in 1675). The king, concluding peace in 1679, set himself energetically to remove the causes of this national humiliation and weakness, and at his death (1697) left his country once more prosperous and powerful. But the ancient foes of Sweden —Denmark, Poland, and Russia — deeming the accession of the youthful Charles XII. (q. v.) a favourable opportunity to recover what they had lost, made common cause against him. As Charles left no heir the nobles conferred the crown upon his sister, Ulrica Eleonore (1718–20), but utilised the opportunity to wrest much of the royal prerogative from her. The new council of state which the nobility chose from their own order made peace with the enemies of Sweden by selling to them the provinces beyond sea, e.g. Bremen and Verden to Hanover, Hither Pomerania to Prussia, and Livonia, Esthonia, Ingermanland, and Karelia to Russia. Thus Sweden fell from the rank of a first-rate power which she had held for about a century. All through the reign of Ulrica and her consort, Frederick of Hesse (crowned king in 1720), as well as throughout the long reign of the weak-kneed Adolphus Frederick (1751–71), the kingdom was dominated by the nobles, who, however, were divided into two parties, the Caps, advocates of peace and opponents of royal absolutism, and the Hats, the war party, who were infected with French ideas. Gustavus III. (q. v.), shortly after his accession, abolished the council of state and restored the constitution that had been in force before Ulrica's accession. But neither he nor his son Gustavus IV. (q. v.), in spite of all they did for Sweden, can be called a wise and successful king.

The principal figure in the reign of the next sovereign, Charles XIII. (1809–18), was the French general Bernadotte, who was adopted as heir to the Swedish crown in 1810, and the principal event the acquisition of Norway (1814). Bernadotte succeeded as Charles XIV. (q. v.) in 1818, and in a reign of twenty-six years directed his energies to such schemes as the making of roads and canals, the cultivation of barren tracts of country, the improve-

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ment of the finances, and the furtherance of education. An agitation for a constitutional reform, which purposed to replace the old diet of four estates by a directly elected parliament, was begun in this reign. But it was not carried until after Oscar I. (1844–59) had ceased to be king and Charles XV. (1859–72) had sat on the throne for seven years. The era of commercial and industrial activity set in in Sweden about the middle of the 19th century; and the national representatives into whose hands power passed with the new constitution — the peasantry and bourgeoisie—have confined their attention to such matters as railway construction, the discussion of free trade and protection, army reform, national insurance for working-men, and so forth. Sweden has enjoyed uninterrupted peace since 1814, although she approached the brink of war with Prussia (on behalf of Denmark) in 1848, with Russia at the time of the Crimean war and again during the Polish rising of 1863, and with Prussia and Austria in 1864. Of late years, especially since 1891, some internal difficulties have arisen through the Norwegians insisting on greater independence for Norway in the foreign policy of the two kingdoms.

See Montelius, *Civilisation of Sweden in Ancient Times* (Eng. trans. 1888); the histories (in Swedish) by Strinnholm, Geijer, Fryxell, and Carlsson. English readers may consult Otté, *Scandinavian History* (Lond. 1875), and Dunham, *History of Denmark, Sweden, and Norway* (Lardner's Cyclopædia, 1834–35).

Literature.—Setting aside what was written in the Old Norse tongue (see ICELAND; DENMARK, p. 758; and RUNES), there is very little Swedish literature to record prior to the Reformation, except a few provincial law-codes, translations of French romances, folk-songs, chronicles (in Swedish and in Latin), the *Visions of St Bridget*, a popular work *On the Conduct of Kings and Princes*, and translations of parts of the Bible.

The forerunners of the national literature were Olaus and Laurentius Petri (q.v.), who brought the Reformation doctrines into Sweden, translated the Bible into good Swedish, and manifested an enlightened regard for their mother-tongue. For several years the principal books were theological and historical, such as the sermons of Matthiä (1592–1670) and Svedberg (1653–1735), which are still read. King Gustavus Adolphus founded the library at Upsala and gave direct encouragement to historical research, as by employing Schroderus (died *c.* 1650) to translate foreign historical works. Messenius (1579–1637) wrote an ambitious history of Sweden in Latin, and illustrated it by a series of historical plays in Swedish, that stood in high repute for more than a century. Political pamphlets and newspapers began to appear about the time of the Thirty Years' War. Bure or Burræus (1568–1652), besides constructing a fantastic scheme of universal knowledge, did sound work in Swedish mythology and language (runes).

But the title of 'Father of Swedish Literature' is usually accorded to Stjernhjelm (1598–1672), who composed didactic and humorous poems in the style of the classic epics. Baron Rosenhane (1619–84), in sonnets (*Venerid*), songs, and lyrics, composed in the manner of the French and Italian Renaissance writers, and 'Eurelius' or Dahlstjerna (1658–1709), in a patriotic epic (*The King's Poet*), and in heroic songs, strove to improve the current standards of literature. The Finlander Frese (1691–1728), who wrote very fair poetry, and Sweden's first satirist, Triewald (died 1743), who attacked the older writers, carry us on to Dalin (1708–63), who used his mother-tongue with an elegance and ease never previously attained. The *Argus* was conducted by him in the style of Addison's *Spectator*, and of his other works may be mentioned the witty allegories *Swedish Freedom* and *Saga about a Horse*. Hedvig Nordenflycht (1718–63) won great fame by her *Sorrowing Turtle-Dove*, a collection of *in memoriam* lyrics. After Dalin's death the leading poets were Count Creutz (1729–85), a Finlander, whose pastoral idyll *Atis and Camilla* was long admired, and Count G. F. Gyllenborg (1731–1808), though none of his books take very high rank. In prose the most notable writers were Mörk (died 1763), author of a didactic romance in the French style, *Adalrik and Göthilda;* Wallenberg (1746–78), who wrote an original work of travel (*My Son at the Galleys*), and the best tragedy (*Susanna*) in the pseudo-classic style since Dalin; and Count von Höpken (1712–89), composer of elegant *éloges* and rhetorical addresses.

But the strength of Swedish intellect in the 18th century seems to have been chiefly expended in the departments of science, as the following names conclusively attest—the Elder Rudbeck (1630–1702), a man of universal scientific attainments and author of *Atland or Manheim* (in both Swedish and Latin), a book, learned, bold, imaginative, written to prove the identity of Sweden with the Paradise of the Bible as well as with the Atlantis of Plato; the Younger Rudbeck (1660–1740), a botanist; Celsius (1701–44), whose name is perpetuated in the thermometric scale; the traveller Forskål (1732–6); Rosén or Rosenstein (1706–73), the founder of Swedish medicine; the great Linnæus (1707–78); the chemists Bergmann (1735–84) and Scheele (1742–86); and Ihre (1707–80), who compiled the first Swedish dictionary. The mystic Swedenborg (1689–1772), who, however, wrote in Latin, also belongs to this period.

The golden age of Swedish literature is coincident with the reigns of Gustavus III. and IV. (1771–1809). On its threshold stands Bellman (1740–95), an improvisatore of the highest genius. His finest work is *Fredman's Epistles*, songs that for gay humour and witty observation are unmatched in the language. Gustavus III., besides the direct and substantial encouragement he gave to the best literary talent amongst his subjects, founded the Swedish Academy (1786), and tried his royal hand at the drama. The foremost *littérateur* of his reign was Kellgren (1751–95), who made the *Stockholm Post* the supreme organ of literary taste in Sweden. In its pages a memorable feud was fought out between the writers of the old (Lutheran) school and the champions of revolutionary views borrowed in great part from the French encyclopædists. With this, however, a purely literary conflict was intertwined, carried on between the partisans of the pseudo-classic standards and the advocates of nature and romanticism. Kellgren, who adhered to the pseudo-classic (French) models, excelled in satiric and lyric poems: his *New Creation* is esteemed one of the finest poems in the language; and in conjunction with the king he composed two lyric dramas, *Gustaf Vasa* and *Christina*. Kellgren's ablest ally was Leopold (1756–1829), a master of polished prose, an excellent critic, and formidable and unsparing satirist, who wrote also in verse—odes, narrative and didactic poems, and weak pseudo-classic dramas. Their principal opponent was Thorild (1759–1808), who urged his contemporaries to cultivate something besides mere form, to emancipate themselves from the trammels of rule and law, and draw inspiration directly from nature. Nevertheless the standards of his rivals, although somewhat modified, continued for many years, chiefly through the Academy, to govern the taste of Swedish writers. Besides the three principal contestants the following participated in the fray: Rosenstein (1752–1824), who wrote on æsthetic and popular philosophic themes; Adlerbeth (1751–1818), author of

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some successful classic dramas and of greatly admired translations of Virgil, Horace, and Ovid; Count Ehrensvärd (1745–1800), whose æsthetic writings are couched in excellent Swedish prose; Count Oxenstjerna (1750–1818), famous for poetic descriptions of nature and humorous and didactic poems, as well as for a good translation of *Paradise Lost;* the poet Lidner (1759–90); and a couple of humorous writers—Kexél (1748–96) and Hallman (1732–1800). Lindegren (died 1815) wrote comedies in the light and sentimental style of Kotzebue. Höijer (1767–1812) is perhaps the ablest and most original philosophical thinker Sweden has produced.

After Leopold's death the mantle of his literary dictatorship was divided between Anna Lenngren (1754–1817) and the Finlander Franzén (1772–1847). The lady, a typical Swedish nature, celebrated the virtues of domestic life with great truth and much poetic feeling. Franzén's lyrics excel in the best qualities of the poets of Finland—a pious naïveté, depth and refinement of feeling, simplicity and clearness of language, and great beauty of versification. Moreover he wrote very good prose (biographies). He is the main link between the Gustavian Academicians and the romantic schools. Archbishop Wallin (1779–1839), besides other poetry, wrote admirable hymns.

Very early in the 19th century ideas akin to those of the German romantic school were promulgated in Sweden by Hammarsköld (1785–1827), a good critic and historian of literature; Livijn (died 1844), author of some extravagant romances and songs; and Askelöf (1787–1848), editor of the magazine *Polyfem*, which, until it was supplanted by *Fosforos*, was the literary organ of the new school. These innovators encountered a good deal of ridicule from the old school, especially from Wallmark (died 1858); and for a time another literary war was waged. But this time the new way of looking at things proved too strong for the Academic champions. The romanticists received valuable support from Atterbom (1790–1855), one of the best lyric poets (cf. *Fågel Blå, Sångerlott*, &c.) of Sweden; from Palmblad (1788–1852), who wrote good romances (*Falkensvärd* and *Aurora Königsmarck*) and clever polemical and miscellaneous works; Dahlgren (1791–1844), whose satire approaches Leopold's and Kellgren's in wit and polish, and whose humorous poems and novels recall Bellman's happiest effusions; Börjesson (1790–1866), the author of one of the best dramas (*Erik XIV.*) in the Swedish tongue; and Agadh (1785–1859), a distinguished publicist. This movement dethroned didactic and pastoral in favour of lyric and epic poetry. There was, however, a richer and more momentous tendency operating contemporaneously with the romantic movement. Atterbom indeed directed attention to the ancient Scandinavian mythology, but it was Geijer (q.v.), no less eminent as a poet than as a historian, who pointed to the manly virtues of the Swedes' ancestors as models for imitation and sources of poetic inspiration. Tegnér (q.v.) showed in his early poems considerable sympathy with the approved Academic standards; but eventually he moved into line with Geijer, and thus stationed himself midway between the pseudo-classic and romantic schools. Around these great leaders of the 'Gothic revival' were grouped a crowd of less gifted writers, the more noteworthy of whom were Ling (1776–1839), who, although he wrote one good drama (*Agne*) and some poems, is best remembered as having convinced his countrymen of the educative importance of gymnastics; Nicander (1799–1839), a lyric poet and author of a promising tragedy; Beskow (1796–1868), a biographer and excellent dramatist (*Thorkel Knutsson*); Afzelius (1785–1871), who composed sentimental tales in melodious verse and along with Geijer edited the first collection of Swedish folk-songs; and Gumælius (1789–1877), the writer of a first-rate historical novel (*Thord Bonde*, in 1828). Next came half-a-dozen authors who stood more or less apart, each by himself. Almqvist (1793–1866), a man of brilliant genius and almost universal knowledge, and master of an exquisite style, excelled, despite his ultra-romanticism, in nearly all departments of literature; his best books are novels (*Book of the Rose* and *The Palace*). Stagnelius (1793–1823), another pronounced romanticist, is esteemed one of Sweden's best lyric poets, chiefly on the strength of the mystic *Lilies in Sharon;* an almost equal excellence distinguishes the grand epic *Vladimir the Great* and the dramas *The Bacchantes* and *The Martyrs*. The satires of Sjöberg or 'Vitalis' (1794–1828) compare not unfavourably with those of Leopold. Satire, too, is the principal note in Bishop Fahlcrantz's (1790–1866) *Noah's Ark*, and in the witty but often coarse improvisations of Wadman (1777–1837) and Detlof von Braun (1813–60). Cederborgh (1784–1835), although he wrote celebrated romances (*Uno von Trasenberg, Ottar Tralling*), does not belong to the romantic school. Böttiger (1807–78) and B. E. Malmström (1816–65) published poetry of more than average merit. 'Talis Qualis' or Strandberg (1818–77), besides writing the satirical and fiery *Songs in Harness*, made an excellent translation of Byron. Wennerberg's (born 1817) student-songs take the same place in Sweden as Von Scheffel's do in Germany.

But a long way the most illustrious poet of the 19th century was the Finlander Runeberg (q.v.), a man of almost the highest poetic genius. The most prominent of the more recent poets are the Swedes Count Snoilsky (born 1841), Rydberg (1829), and Bååth (1853), and the Finlanders Topelius (1818) and Tavaststjerna (1860). Amongst the remaining poets of the same period may be mentioned Sturzén-Becker or 'Orvar Odd' (1811–69) and King Oscar II. (1829). The 19th century has more than atoned for the paucity of novelists in its predecessors. Amongst the earliest to write in the modern spirit was Sophia von Knorring (1797–1848), who described the domestic life of aristocratic circles. But she is overshadowed by Frederika Bremer (q.v.) and Emilie Flygare-Carlén (1807–92), whose stories of the western skerries (*A Merchant's House in the Skerries, The Rose of Tistelön*) were deservedly very popular. Other female novelists of repute are Sophia Schwartz (born 1819); Frederika Runeberg (1807–79), wife of the poet; Fru Kerfstedt (1835); and Helene Nyblom (1845). Of the sterner sex Mellin (1803–76) and Sparre (1790–1871) cultivated the historical novel with more or less success. Wetterbergh or 'Uncle Adam' (1804–89) was a warm favourite for his democratic tales and his simple and humorous *Genre Pictures* of Swedish life. Rydberg the poet won fame also for his semi-historical novels (*The Last Athenian, Roman Days*) and learned works on Scandinavian mythology. Crusenstolpe (1795–1865) and 'Orvar Odd' are, like Rydberg, held up as models of Swedish prose—the former in novels, the latter in sketches and vignettes of Swedish life and in essays and critical papers. The poet Topelius has produced what are perhaps the most artistic historical novels in modern Swedish literature: his (prose) *Army Surgeon's Stories* ranks with Runeberg's *Ensign Stål's Tales*.

The light comedies of Blanche (1811–68) and of Jolin (1818–84), as well as the short stories and sketches of the former, run in the same vein of moderate romanticism that distinguishes the novels of 'Uncle Adam' and the verse of 'Talis Qualis' and 'Orvar Odd.' The plays of F. Hedberg (born

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1828) are somewhat more serious in aim. F. A. Dahlgren translated Shakespeare, Calderon, and Heiberg (Dane), and wrote a good popular play (*The Vermlanders*) and memoirs of the Stockholm stage. The poet Bäckström (1841–86) has written some good lyric dramas.

In quite recent years a whole literature has grown up out of the social problems and discussions of the day, especially the questions of literary realism *versus* idealism and of the relations of the sexes. The novel and the drama are the favourite forms of this literature; and deep earnestness, often bitter and pessimistic in mood, and a keen spirit of contention characterise most of its writers. The foremost in this 'modern' movement is Strindberg (q.v.); his fellow-workers, or more frequently antagonists, are Nordensvan (born 1855); Af Geijerstam (1858); Tor Hedberg (1861), one of the most promising of the younger writers; Levertin, the poet; Anna Edgren (1849), in descriptions of Stockholm society and in plays; Fru Agrell (1849), a playwright; Victoria Benedictsson or 'Ernst Ahlgren' (1850–88), in the excellent novels *Fru Marianne* and *Money;* and Matilda Roos (1852), a novelist. Molander (1858) has begun a promising career as a dramatist. Two novelists of promise have come forward recently—Af Heidenstam and Selma Lagerlöf (*Gösta Berlings Saga*). Lundqvist, Bondeson, and Hedenstjerna or 'Sigurd' enjoy considerable popularity as writers of fiction in a minor key.

The chief representatives of the more special departments of literature during the 19th century can only be briefly enumerated. Historians: Geijer (q.v.), Fryxell (q.v.), Strinnholm (1786–1826), Carlsson (1811–87), Axelson, Odhner (born 1836), and Bååth; the principal historians of literature are quoted in the bibliography subjoined to this article. Literary critics: Ola Hansson and the Finlander Vasenius. The ancient civilisation and antiquities of Sweden: Montelius (born 1843), H. Hildebrand (1842), B. E. Hildebrand (1806–84), Nilsson (1787–1883), Rydberg, and Nyström. Church History: Cornelius (born 1828), Reuterdahl (1795–1870), and Anjou (1803–84). In public affairs and economics the writings of H. Järta (1774–1847), L. Järta (1801–72), and Agardh (1785–1859) rise above the average level. Boström (1797–1866) was an able philosopher. The most popular writers of devotional and religious books have been the poet Franzén, Schartau (1757–1825) Wallin, and Thomander (1798–1865). Philology boasts of Rydqvist (1800–78), Säve (1812–76), and Rietz (1815–68); law and jurisprudence of Schlyter (1795–1888) and Holmbergsson (1764–1842); ethnology of Retzius (1796–1860); botany of Fries (q.v.); chemistry of Berzelius (q.v.); and geographical exploration of Nordenskiöld (q.v.).

See G. H. J. Ljunggren, *Svenska Vitterhetens Häfder efter Gustaf III.'s Död* (Lund, 1873 *et seq.*); J. H. E. Schück, *Svensk Literatur-historia* (Stockh. 1886 *et seq.*); Fryxell, *Bidrag til Sveriges Literatur-historia* (1860–62); Malmström, *Grunddragen af Svenska Vitterhetens Historia* (1866–68): Wieselgren, *Sveriges Sköna Literatur* (1843–49); and consult Schweitzer's useful *Geschichte der Skandinavischen Literatur* (Leip. 1886–89), and Vasenius, *Lärobok i Sveriges og Finlands Literatur-historia* (1887).

Swedenborg, EMANUEL, was born in Stockholm, January 29, 1688, and died in London, March 29, 1772. His father was Jesper Svedberg, subsequently Bishop of Skara. Swedenborg's lifetime divides itself into two distinct periods; the first, ending with his fifty-fifth year, was given to business, science, and philosophy; the second, of nearly thirty years, was devoted to theology and spiritual communion. Swedenborg was educated at Upsala, and subsequently travelled for four years in England, Holland, France, and Germany. On his return to Sweden he was appointed by Charles XII. an assessor in the College of Mines, and rendered some service to that monarch at the siege of Frederikshall as military engineer. The family was ennobled in 1719, and the name changed from Svedberg to Swedenborg. Swedenborg is sometimes styled Count or Baron, but erroneously; he was neither, though he had a seat in the Swedish House of Nobles as the head of his family. His mind at this time was busy with mechanical and economical projects. He published short treatises on algebra, giving the first account in Swedish of the differential and integral calculus; on a mode of finding the longitude at sea by the moon; on decimal money and measures; on the motion and position of the earth and planets; on the depth of the sea, and greater force of the tides in the ancient world; on docks, sluices, and saltworks; and on chemistry as atomic geometry. In 1724 he was offered the professorship of mathematics at Upsala, which he declined from a dislike of non-practical science. Abandoning desultory studies, he devoted himself for ten years to the duties of his assessorship and to a systematic study of the methods of mining and smelting at home and abroad, and to the construction of a theory of the origin of creation. The result appeared at Leipsic, at the expense of the Duke of Brunswick, in 1734, in three massive folios, beautifully illustrated, entitled *Opera Philosophica et Mineralia.* The second and third volumes describe the best methods employed in the manufacture of iron, copper, and brass. The first volume, entitled *Principia, or the First Principles of Natural Things, being new Attempts towards a Philosophical Explanation of the Elementary World,* is an elaborate deduction of matter from 'points of pure motion produced immediately from the Infinite.' This was followed in the same year by *Philosophical Argument on the Infinite, and the Final Cause of Creation; and on the Mechanism of the Operation of Soul and Body,* carrying the doctrine of the *Principia* into higher regions, and resolving the soul into points of motion, the soul being treated as one in substance with the sun. Dissatisfied with his conclusions, he determined to track the soul to its inmost recesses in the body. His studies in human anatomy and physiology with this end in view were embodied in his *Economy of the Animal Kingdom* (2 vols. 1741) and his *Animal Kingdom* (3 vols. unfinished, 1744–45).

At this point his course as a natural philosopher was arrested, and he entered on his career as spiritual seer. The particulars of the transition are recorded in his diary for 1743–44, and comprise a variety of curious dreams and strange communings; he now professed to enjoy free access to the spiritual world. He resigned his assessorship in 1747, that he might devote himself to the office to which the Lord had called him. In 1749 he made his first public utterance in his new character in the issue in London of the *Heavenly Arcana* (1749–56, 8 vols. 4to.). His life henceforward was spent chiefly between Stockholm, London, and Amsterdam, in writing and printing a variety of works in exposition of his experience and doctrines. There is little in any of these which is not to be found in outline at least in the *Heavenly Arcana,* and a note of its contents may serve, therefore, as a general description of the whole. With many digressions, the *Heavenly Arcana* is a revelation of the internal or spiritual sense of Genesis and Exodus. The early chapters of Genesis are a fragment of an older Word, preserved at this day in Tartary, and are an allegorical and not a literal history. Adam signifies the Most Ancient Church, and the Flood its dissolution; Noah, the Ancient

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Church, which falling into idolatry was superseded by the Jewish. The spiritual sense pervades the Scriptures, which are the genuine Word of God, as the soul does the body. The exceptions are Ruth, the Chronicles, Ezra, Nehemiah, Esther, Job, Proverbs, Ecclesiastes, the Song of Solomon, the Acts of the Apostles, and the Epistles. These books have an edifying natural sense like other good productions of human authors, but, inasmuch as they do not possess the internal sense, they are not held to be inspired. The Scriptures are read in heaven in their spiritual sense, but, as that sense treats exclusively of God and man as a spiritual being, it is void of every reference to earthly scenes, persons, and events. By reason of its symbolism of the inward sense, the letter of Scripture is holy in every jot and tittle, and has been preserved in immaculate perfection since the hour of its Divine dictation. The Jewish dispensation having reached its period, God appeared in Jesus Christ; He assumed human nature in its humblest condition in the Virgin, wrought it into conformity with Himself, 'glorified and made it Divine.' The effluence from the Lord's Divine humanity is the Holy Spirit. In a sense the reverse of Socinian, Swedenborg was a Unitarian; he saw God in the Saviour, and regarded Him as the sole object of worship. The church initiated by the Divine Advent came to an end in the 18th century, and Swedenborg witnessed the Last Judgment effected in the year 1757 in the World of Spirits. Then commenced a new dispensation, signified by the New Jerusalem in the Revelation, of which Swedenborg was the precursor, and his writings contain the doctrine. To the objection, that the doctrine is strange and novel, he replied that mankind were not prepared for its reception before that time, and that the early Christians were too simple to understand it.

One object of his mission was the revival of the lost science of correspondences—the science of sciences in the most ancient times. The law of correspondence is universal; the natural world is the outbirth of the spiritual world, and the spiritual world of the invisible mental world. Unseen evil is manifested in things hurtful and ugly, unseen good in things useful and beautiful. Man is a summary of nature; nature is man in diffusion; all things, therefore, in nature—fire, air, earth, and water—every beast, bird, fish, insect, and reptile—every tree, herb, fruit, and flower—represent and express unseen things in the mind of man. The Scriptures are written according to correspondences, and by aid of the science their mysteries are unlocked. By it, too, the constitution of heaven and hell is revealed. There are three heavens, consisting of three orders of angels: the first distinguished for love, the second for wisdom, and the last for obedience. All angels have lived on earth; none were created such. They are men and women in every respect; they marry and live in societies in cities and countries just as in the world, but in happiness and glory ineffable. All in whom love to God and man is the ruling principle go to heaven at death. Between heaven and hell a perfect equilibrium is maintained. As there are three heavens so there are three hells, and every angelic society has an infernal opposite. Hell, as a whole, is called the Devil and Satan; there is no individual bearing that name. All in whom self-love is the ruling motive go to hell. There is no resurrection of the earthly body. Every one passes to his final lot at death, some making a short sojourn in an intermediate state, designated the World of Spirits, where the good are cured of their superficial infirmities and intellectual errors, and where the evil are stripped of all their pretences to good. Swedenborg's other notable works (all first published in Latin) are *Heaven and Hell*, *The New Jerusalem and its Heavenly Doctrine*, *Angelic Wisdom concerning the Divine Love and the Divine Wisdom*, *Angelic Wisdom concerning the Divine Providence*, *The Apocalypse Revealed*, and *The Delights of Wisdom concerning Conjugal Love*; his whole translated theological works numbering forty volumes of a good size.

Swedenborg professed to enjoy acquaintance with many departed celebrities, and some of his verdicts on character reverse the estimates of history. Nor was his intercourse confined to spirits from earth, but extended to souls from the moon and the planets. For these visions, experienced whilst sitting in his chamber, he had this explanation: although in the spiritual world there are *appearances* of space, there is nothing of the objective reality which here divides London from Melbourne. If one spirit desires to see another, the desire instantly brings them together. A good man is, as to his mind, in heaven, and an evil man in hell; and supposing the spiritual sight of either were opened—i.e. if the eyes of the spiritual body, which transfuse and animate the material ones, were disengaged from their fleshly vesture—he would see his spiritual companions and the country where he would abide after death.

The grand and distinctive principle of Swedenborgian theology, next to the doctrine of the Divine Humanity, is the doctrine of life. God alone lives. Creation is dead—man is dead; and their apparent life is from the Divine presence. God is everywhere the same. It fallaciously appears as if He were different in one man and in another. The difference is in the recipients; by one He is not received in the same degree as another. A man more adequately manifests God than a tree; that is the only distinction. The life of devils is God's presence perverted in disorderly forms. 'All things, and each of them to the very uttermost, exist and subsist instantly from God. If the connection of anything with Him were broken for a moment it would instantly vanish; for existence is perpetual subsistence, and preservation is perpetual creation.' By this law of life is explained man's self-consciousness, freedom, and personality—notions communicated from God to man.

Swedenborg made no attempt to establish a sect. When he proclaimed the Christian Church at an end, his expectation was that a new church would be raised up among the Gentiles; but towards the close of his life he spent his energies in attacking orthodox theology, Catholic and Protestant, as if bent on the conversion of Christian lands, but especially of northern Europe. All his works were written in Latin, and received small measure of attention from his contemporaries. Swedenborg was shrewd in worldly affairs, affable in society, and discussed politics and finance in the Swedish Diet like a man of the world, and that for nearly a score of years after he began to write and publish his theological works. He was never married. His diet was chiefly but not wholly vegetarian.

The Swedenborgians, or, as they designate themselves in their corporate capacity, 'The New Church signified by the New Jerusalem in the Revelation,' were first organised as a distinct denomination in 1788 by Robert Hindmarsh (1759–1835), a printer in Clerkenwell, who became one of the first ministers of the body. The Swedenborgians accepted Swedenborg's voluminous theological writings as containing a revelation from heaven. The body has grown steadily but not quickly. The number of its registered members in Britain in 1891 was 6239, divided into 75 congregations, chiefly in the large towns and in Lancashire; five are in Scotland, one in Wales, but none in Ireland. Their General Conference holds £66,431 invested on behalf of

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various missionary and church uses. There have always been a number of receivers of the doctrines of Swedenborg among the clergy of the Church of England. The first translator of the *Heavenly Arcana* and many of the other theological writings of Swedenborg was the Rev. John Clowes (1743–1831), rector of St John's, Manchester, for sixty-two years, who both in the pulpit and in his numerous publications made no secret of his faith. From the first those who accepted Swedenborg's teachings have been divided into separatists and non-separatists. In the United States the Swedenborgians have 104 societies and 5803 members, chiefly in the northern states; the largest congregation is in Boston. In France, Germany, Switzerland, Sweden, Denmark, Italy, and Russia there are Swedenborgians, but they are so few and scattered that there are but eight congregations in these countries which meet for divine worship every Sunday. There is a Swedenborg Society, established in 1810, for printing and publishing Swedenborg's works, with a house in London, and an income of about £600 a year. They have a National Missionary Institution and eight local missionary committees, a training college for their ministry, and an orphanage.

See the biographies of Swedenborg by W. White (Lond. 1867), by J. J. Garth Wilkinson (1886), and *Documents concerning the Life and Character of Swedenborg*, by Professor R. L. Tafel (3 vols. 1875–77).

Sweeps are oars of great length used during a calm or in still water, either to assist the rudder or to propel the vessel. See also CHIMNEY.

Sweepstakes, a method of gambling by which several persons contribute each certain stakes, the whole of which fall to one when a certain event happens. In the case of horseraces, each contributor gets either a horse or a blank (by lot or otherwise), and the one whose horse wins takes the stakes, though often the other horses that are 'placed' secure a share for those who have drawn them. Raffles and sweeps are illegal, though constantly carried on without interference from the authorities (see GAMBLING). The Pari-Mutuel is a kind of sweepstakes (see BETTING).

Sweet Bay. See LAUREL. For Sweet Brier, see ROSE; and for Sweet Flag, CALAMUS.

Sweetbread, the Pancreas (q.v.) of an animal, used as food; it is highly esteemed as being both delicate and nutritious.

Sweet Pea (*Lathyrus odoratus*), a familiar garden annual plant belonging to the natural order Leguminosæ. It is a native of Sicily and other parts of the south of Europe, and has been cultivated for its beautiful and fragrant flowers in British gardens for about two hundred years. The varieties are very numerous, distinguished chiefly by the different shades of colour of the flowers. It is cultivated as a hardy annual, and is so hardy that it may be sown in autumn and will not only withstand the cold of winter in all but the coldest districts, but will bloom earlier and better than when sown only in spring. Sowing in the latter season is, however, necessary to provide prolongation of bloom. Other species of Lathyrus are of interest either as ornamental plants or for the food for man or cattle which they yield. The Everlasting Pea (*L. latifolius*) is an old favourite in flower-gardens on account of its handsome but scentless flowers. The roots of *L. tuberosus* are eaten in Holland and other countries where it grows plentifully. The Chickling Vetch (*L. sativus*) is much used in Switzerland as fodder for cattle. The seeds ground into meal make palatable bread, but to its use was ascribed sudden attacks of loss of power and rigidity of the limbs in both men and the lower animals, which were so prevalent in the latter part of the 17th and early in the 18th century that an edict was issued forbidding its use. Mixed with half the quantity of wheat-flour it is said to be wholesome; the peasantry in Italy use it in this way.

Sweet Potato (*Batatas*), a genus of plants belonging to the natural order Convolvulaceæ. *B. edulis*, the true sweet potato, is a twining or climbing plant, with stems 5 or 6 feet long trailing on the ground or clambering over neighbouring shrubs. The leaves are 5 or 6 inches long, heart-shaped at the base; the flowers pale purple, closely resembling those of the common convolvulus or bindweed. Having been long cultivated in the tropical and subtropical countries of both hemispheres, the native country of the plant is a matter of conjecture. It appears to be first mentioned by Pigafetta, an author of the 16th century, who found the root much used by the Indians of Brazil as an

Sweet Potato (*Batatas edulis*).

article of food. It was introduced into Spain about 1519, and the roots were known in England some time before the introduction of the potato, with which they were often confounded by the earlier writers on the latter. English supplies in those times were obtained from Spain and the Canary Islands, and the roots, when steeped in wine or made into sweetmeats, were regarded as restorative of failing vigour. The plant is cultivated in India, China, Japan, the Malayan Archipelago, throughout tropical America, and in the southern United States, in southern Europe, the Canary Islands, Madeira, and North Africa. The roots grow to a great size—to as much as 50 lb. weight, according to some authorities, in Java, but the ordinary average is from 3 to 12 lb. In favourable conditions in the United States the yield per acre is from 200 to 300 bushels. The taste of the roots is sweetish and agreeable, and they are considered to be superior to the common potato in flesh-forming matters. *B. jalapa*, a species of Mexico, though purgative, is not the source of the true jalap of the pharmacopœia, as its name implies, but is so called on account of its being very common in the vicinity of the Mexican town Jalapa. *B. paniculata*, which has a very wide geographic distribution, is commonly cultivated for food in western tropical Africa. From the seeds of another species of Batatas the textile material named Natal Cotton is obtained; it has some resemblance to the true cotton.

Sweet William. See PINK.

Swetchine, MADAME (*née* Soymanof), was born at Moscow in 1782, joined the Roman

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Catholic communion under the influence of Joseph de Maistre in November 1815, and settled in France about the end of 1816, dying at Paris in 1857. For about forty years she maintained at Paris a famous salon, characterised by the remarkable peculiarity of a distinctly theological bias. Her husband, General Swetchine, was a quiet, inoffensive man, twenty-five years her senior; she herself was small and plain, with a Calmuck nose and ill-matched eyes; yet she possessed a spiritual beauty and a charm of personality of altogether unusual kind. Her passionate nature had early found safety and perhaps happiness in rigidity of principle and an austere love of heaven; she never had a child; and almost from youth until the end her life was marked with more than the enthusiasm of the convert. Yet she tempered the ardour of zealous and propagandist orthodoxy with all the courtesy of the great world. The church had granted her the rare indulgence of a private chapel in her house, and from the dialectic play of intellect in the salon she passed easily to rapt worship and spiritual communion with God. Her letters and writings, such as those on Old Age and Resignation, show subtle thought and elevation of tone, if scarcely distinction of style, but lack the peculiar charm that belonged to her personality, and scarcely justify the enthusiasm of her group of friends whose admiration soon passed into worship.

See M. de Falloux, *Madame Swetchine, sa Vie et ses Œuvres* (2 vols. 1860), and her Lettres, by the same editor (2 vols. 1861); also Sainte-Beuve, in *Nouveaux Lundis*, vol. i., and E. Scherer, in *Études sur la Littérature Contemporaine*, vol. i.

Swietenia. See MAHOGANY.

Swift, a genus (Cypselus) and family (Cypselidæ) of Picarian birds, resembling the swallows in general appearance and habits, but most closely allied by anatomical structure to the hummingbirds. They may be distinguished by external characters from swallows thus: 'the swifts have ten primaries, not more than seven secondaries, and only ten tail-feathers, while the swallows have but nine primaries, at least nine secondaries, and twelve tail-feathers.' They have long pointed wings, a short tail, and possess remarkable powers of rapid and prolonged flight. The bill is short, depressed, and weak; the gape wide and fringed by bristles. The legs and toes are short and weak. In distribution the swifts are almost cosmopolitan, but are absent from New Zealand. Two groups are recognised, (*a*) the Micropodinæ, or true swifts, with the first toe directed more or less forwards, and a reduced number of phalanges in the third and fourth toes, and (*b*) the Chæturinæ, with the first toe directed backwards and the normal number of phalanges in the third and fourth toes. The Common Swift (*Cypselus apus*) is common in almost all parts of the north of Europe and Asia in summer, retiring to tropical or subtropical regions in winter, extending its migrations to the extreme south of Africa. It occurs even in Lapland. Its residence in its summer quarters is much shorter than that of swallows; and it is worthy of notice that the swift is seldom to be seen along with any of the swallows or martins, the different kinds choosing different localities, even although very close together. The swift is easily recognised in its flight by the remarkably sickle-shaped wings, and its slight scream is very different from the twitter of the swallow. It is bronzed blackish brown, with a white throat; bill, toes, and claws black. It makes its nest in holes in rocks and walls, often in the thatch of houses, crevices in sea-cliffs, quarries, chalk-pits, and trees. The nest is formed of bits of straw, dry blades of grass and bents, feathers, and other such substances, which are apparently glued together by a viscid secretion. The eggs are two in number, and as a rule only one brood is hatched in a season. The swift, like the swallow, seems to return to the same place to nest year after year, and repairs the old nest instead of making a new one. Sometimes it robs martins, sparrows, and even starlings of their nests. Its chief food consists of insects, and the undigested remains are ejected in the form of pellets. The Alpine Swift, or White-bellied

Common Swift (*Cypselus apus*).

Swift (*C. alpinus*), is rarely seen in Britain, but is common in summer on all the high mountain-ranges of southern and central Europe. Eastwards it ranges through Asia Minor and Persia to many parts of India and Ceylon. It is supposed to breed in the extreme south of Africa, where it is common. It builds in high rocks, sometimes in steeples, notably in the cathedral at Bern. It is larger than the common swift, and has a louder note and flies more powerfully. The Needle-tailed Swift (*Acanthylis caudacuta*), an Asiatic species, has been twice found in England, each time in the month of July, but nowhere else in Europe. It is common during summer in south-eastern Siberia, Mongolia, Japan, China, and Tibet; while in winter it migrates as far south as to Eastern Australia and Tasmania. The American Swift (*Chætura pelagica*) has the hind-toe directed backwards, and the tail-feathers stiff and pointed, as in woodpeckers. It is a small bird, not above 4½ inches in entire length, but one foot in extent of wing. The general colour is brownish black, with greenish reflections, the throat grayish white, the under parts grayish brown. The nest is made of small dry twigs, which the bird breaks off from the tree, and carries away in its feet; and they are attached by means of a viscid secretion to the rock, wall, or hollow tree where the nest is made. From its frequently building in chimneys this species is known as the *Chimney-swift* in North America, where it is a regular migrant in many parts, wintering in Mexico. Great numbers often build together, sometimes choosing for this purpose an unused chimney in a town. The Swiftlets, genus Collocalia, found from India to the Malay Archipelago and in many of the Polynesian islands, one species even in Madagascar, are the builders of Edible Nests (q.v.). They breed in deep caves and fix their gelatinous-looking nests, made of mucus unmixed with any vegetable product, to the walls. The nest of one of the true swifts (*Panyptila sancti-hieronymi*) discovered in

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Guatemala is perhaps still more remarkable, being composed entirely of the seeds of a plant secured together and hung from the under surface of an overhanging rock by the saliva of the bird. 'The whole forms a tube 2 feet 2 inches long by about 6 inches in diameter. The entrance is through the lower end of the tube, and the eggs are placed on a shelf at the top. About the middle of the tube, on the external side, is a protruding eave as if overvaulting an entrance; but there is no hole, and it has the appearance as if it was placed there on purpose in order to deceive some enemy, such as a snake or lizard,' especially during the period of incubation. The Palm Swift of Jamaica (*Micropus phœnicobia*) is also a remarkable nest-builder, attaching its nest of feathers and silk-cotton, felted together, to the surface of a spathe or of a leaf by means of its salivary secretion.

Swift, JONATHAN, Dean of St Patrick's, and the greatest of English prose satirists, came of a Yorkshire clerical family on his father Jonathan's side, while his mother was Abigail Erick of Leicestershire. He was thus related to two English poets, as a Swift to Dryden—for his grandmother was niece to the poet's grandfather, and as an Erick or Herrick to the author of the *Hesperides*. Jonathan Swift was born on 30th November 1667, seven months after his father's early death, at 7 Hoey's Court, which formerly stood near the Castle at Dublin. The only other child was his elder sister Jane. Left with the miserable provision of twenty pounds a year, his mother returned to her family in Leicester, leaving her son's education to the care of his uncle Godwin Swift, who sent him at the age of six to Kilkenny School (then the best in Ireland), where he had Congreve for a schoolfellow, and in 1682 entered him at the age of fourteen at Trinity College, Dublin. His college career was desultory, probably wild, and certainly unsuccessful; and he only obtained his degree *speciali gratiâ* in 1686. Two years later the turmoil of the Revolution drove him to England, where in 1689 he was received as secretary into the household of the distinguished statesman Sir William Temple (q. v.)—a distant connection of his mother—at Moor Park in Surrey. His proud and independent nature, however, rebelled against the subserviency of the occupation, and after declining a captaincy of horse offered him by William III., who visited Temple's house, and also a clerkship in the Irish Rolls Office tendered by his employer, he left Moor Park for Dublin, where he took orders (deacon, October 1694; priest, January 1695), and was presented by the Lord Deputy to the prebend of Kilroot, near Belfast, of the value of £100 a year Country obscurity soon proved even less to his taste than waiting upon a great man's literary inspirations, and he was not sorry in 1696 to resign his prebend and accept Temple's invitation to return to Moor Park and help him with his papers. By this time Hester Johnson (born at Sheen, 13th March 1681)—immortalised by Swift under the name of Stella—the daughter of a gentlewoman who acted as companion to Lady Giffard, Temple's widowed sister, had grown up into a charming, beautiful, and intelligent girl, and the kindly solicitude of the young Irishman who guided her education was developing into the enduring affection which became the happiness of their two lives. Swift remained at Moor Park till Temple's death in 1699, when he received a legacy of £100 and the privilege of publishing Sir William's posthumous works (which he brought out between 1700 and 1720). His long residence in the house of a cultivated man of the world, despite the subordination that chafed his sensitive pride, had been useful to him. He had found leisure to study; he read enormously in classical and historical literature; he had been brought into personal relations with the king and the ministers, and had learned the business of the politician, which he was soon to practise with signal success. Moreover, the quiet retirement of Temple's house and the solitude of his Irish cure had given him time to produce a masterpiece and a brilliant *tour de force*—the *Tale of a Tub*, and the *Battle of the Books*. The former is held by some critics to be the greatest of Swift's satires; in style and as an artistic whole it certainly stands first. In none of his works is the satire more pointed, the thought more vigorous, the language more nervous and sustained. The cant of religion, the pretensions of letters, the hypocrisies of every form of false virtue or genius are exposed with the keen enjoyment of the iconoclast; the mask is torn from the solemn shams of the world amid derisive laughter. The young genius rejoices in its strength, and spares nothing in its destructive work; and to many minds there is something repellent and sacrilegious in its handling of time-honoured beliefs and institutions, though no profanity was intended. The *Battle of the Books*, an admirable travesty of the idle controversy then waging between Temple, Wotton, Boyle, and Bentley, concerning the comparative merits of ancient and modern writers, is a much slighter work, but full of exuberant vitality and humour. Both were published anonymously, like almost all Swift's works, in 1704.

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Soon after Temple's death, failing in his application to the court for preferment, Swift became secretary to Lord Berkeley, one of the Lords Deputies to Ireland, and his wit enlivened the society of Dublin Castle by such jests as the *Petition of Mrs Frances Harris* (1700), in verse, and the parody of Boyle, *A Meditation upon a Broomstick* (1704), in prose. After being disappointed of the deanery of Derry, he was given the vicarage of Laracor, near Trim, in West Meath, in 1700, and presented to a prebend in St Patrick's Cathedral; and in 1701 he took his doctor's degree at T. C. D. From 1701 to 1710 he divided his time between Laracor and London, where he was employed on ecclesiastical business by the Archbishop of Dublin, and where he contrived to live for half each year on £60. His reputation as a wit, and his suspected authorship of the *Tale of a Tub* and the *Battle of the Books* (to say nothing of his earliest publication, the *Dissensions in Athens and Rome*, a defence of Lord Berkeley, 1701), assured his position in society and in the clubs and coffee-houses, where he constantly spent his evenings with Addison, Rowe, Prior, Congreve, and every one else worth meeting, and found himself ever more and more in request. He now wrote his humorous squibs on the unlucky almanac-maker, Partridge, under the pseudonym of Isaac Bickerstaff, and vindicated his position and opinions as a churchman (sorely damaged by the free speaking of the *Tale of a Tub*) in the *Argument to Prove the Inconvenience of abolishing Christianity*, the *Project for the Advancement of Religion*, and the *Sentiments of a Church of England Man* (all in 1708). At Laracor he busied himself with improving the vicarage, church, glebe, and garden, of which he was fond. 'I stayed above half the time,' he says, 'in one scurvy acre of ground, and I always left it with regret.' The regret was heightened by the circumstance that 'Stella,' who had come to Ireland with her companion, Rebecca Dingley, by Swift's advice, after Temple's death, passed much of her time between Trim and Dublin.

For the next three years, from September 1710 to June 1713, Swift was chiefly in London, incessantly engaged in political work. The Whigs had

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done nothing for him, and he detested their war-policy and their views on the church establishment. The Tories, on the other hand, were full of civility and deference, and longed to win his pungent pen to their cause. Moreover, Swift was personally attracted by the character of Harley, the Lord Treasurer, and a warm friendship soon sprang up between these utterly dissimilar natures. So Swift abandoned his neutral position and became a Tory, and taking over the editorship of the *Examiner*, which had languished in its early days under Bolingbroke and Atterbury, converted it into a deadly weapon of attack against the Whigs. Swift's *Examiners*, thirty-three in number (November 1710 to June 1711), may almost be said to have created the 'leading article' and established the power of the press. They are not remarkable for rhetoric or eloquence, but are simple plain trenchant statements of policy and criticisms of opponents, such as the honest country squire could understand, and would have made himself if he had known how. The backbone of Swift's policy was denunciation of the war party as a ring of Whig stockjobbers, who cared nothing for the country, but out of self-interest played into the hands of the Emperor and the Allies. He urged this view, together with his firm belief in the landed interest and the establishment, in numerous brief and telling skits and broadsides in prose and verse, besides several elaborate argumentative pamphlets, such as the *Advice to the October Club* (1712); *Remarks on the Barrier Treaty* (1712); and the *Public Spirit of the Whigs*, a crushing reply to Steele's *Crisis* (1714); but nowhere so ably and forcibly as in his political masterpiece *The Conduct of the Allies*, published on November 27, 1711, of which the second edition was sold out in five hours on December 1, and a seventh edition reached in the new year. These writings undoubtedly contributed to the overthrow of Marlborough and the conclusion of the peace of Utrecht in 1713. Among slighter satires of this time may be mentioned *The Virtues of Sid Hamet the Magician's Rod* (1710), directed against Godolphin, and the *Windsor Prophecy* (1711). Swift was also engaged preparing his *History of the Last Four Years of Queen Anne*, a laboured production, which was not published till much later; and he also wrote, under his own name, a *Proposal for correcting, &c. the English Tongue* (1712), which includes the oft-suggested notion of a national academy of letters. His life during these three eventful and laborious years is minutely recorded in his wonderful *Journal to Stella*, the most faithful and fascinating diary the world has ever seen, in which all his hopes and fears, his daily work and occupations, his growing influence with ministers, everything in short that he did and all that he thought, are set down in perfect honesty and with no thought of publication, but only for the sympathetic interest of his life-companion Hester Johnson. High affairs of state mingle with playful tenderness and the sweet familiarity of the 'little language,' with a natural charm and frankness which make the *Journal* unique.

Swift's reward for his unwearied labour on behalf of the Tory administration was poor enough. He had throughout kept his independence, and declined to accept the pay of the government like a hired hack. He waited for ecclesiastical preferment; but the queen would not bestow a bishopric on the author of the *Tale of a Tub*. At last in the evil days that preceded the fall of the ministry he was given the Deanery of St Patrick's at Dublin (April 1713), though he would rather have been sent anywhere else. A year later the crisis came; Harley (now Earl of Oxford) resigned, the queen died, the Whigs came into office, and Swift's prospect of political influence in London was gone forever.

A romantic episode in his London life had been the passion he inspired in Esther Vanhomrigh (b. 14th February 1692), whom in his usual fashion he called 'Vanessa,' a young girl whom he grew to know intimately at her mother's house in London in 1709–13. He had a fatal habit of playing the mentor to women without looking to the consequences, and there can be no doubt that he behaved with little circumspection in his relations with Vanessa. When he went to Ireland she followed him, and lived sometimes at Dublin and sometimes at a place she had inherited at Celbridge. Whether Swift was married to 'Stella' or not (and there is no satisfactory evidence for the alleged marriage in 1716), the presence of 'Vanessa' in Turnstile Alley, and of Stella in Ormond Quay, on the other side of the Liffey, must have been extremely embarrassing to the solitary tenant of the Deanery between the two; and there is no doubt that he tried to repress Vanessa's passion. She died of a consumption in 1723, and by her testamentary directions Swift's metrical version of their romance was published, with the title *Cadenus* [i.e. *Decanus*] *and Vanessa* (1726). But what his real relations were with the two women, why he did not marry, or, if he did eventually go through the mere ceremony with 'Stella,' as the legend tells, why he kept his marriage a profound secret, and why they never lived together, remain mysteries still, in spite of more than one plausible explanation. The theory that he believed himself tainted with hereditary madness, supported by the fact that he suffered from mysterious attacks in the head due to a disease in the ear, appears to furnish the best clue to his determination to abjure the privilege of fatherhood; and another reason for his abstinence, compatible with this, has been deduced from the fact that he seems to have never experienced the ordinary emotion of passion. Whatever his passing feeling for 'Vanessa,' there can be no doubt that he was devotedly attached to 'Stella' to her dying day (28th January 1728), and that in all senses but one few women have been better loved.

When his hopes of further political work in England were demolished by the accession of King George and the Whigs, Swift, now a man of forty-seven, retired to his deanery, and with the exception of two journeys to England in 1726 and 1727, and occasional visits to friends in Ireland, remained there for nearly thirty years. But political influence and activity were essential to his masterful nature, and accordingly he devoted his energies to the wrongs of Ireland, which were then very real indeed. He did this from no love of the land of his exile, nor out of sympathy with the true Irish: he considered Dublin merely 'a good enough place to die in,' and his voice was raised chiefly on behalf of the narrow Ireland of the Englishry. He defended Ireland only out of 'a perfect hatred of tyranny and oppression' wherever it was found. Nevertheless his ungracious mediation and his unpalatable home-truths bore marvellous fruit throughout the country; he created and guided popular opinion and for a while made it a power; and the generous impulsive populace worshipped him. His Irish tracts (of which the famous *Drapier's Letters*, 1724, directed against a supposed fraudulent introduction of a copper currency known as 'Wood's halfpence;' the *Proposal for the Universal Use of Irish Manufactures*, 1720; and the audacious *Modest Proposal* for utilising children as articles of food, 1729, are among the best examples) possess all the merits of his style and method, his inflexible logic, his delightful reductions to absurdity, his burning passion, his tremendous scorn, and his

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unsparing virulence in attack. He brought the law upon his printer more than once, but he won the day. 'Wood's halfpence' were suppressed, and the Lord-lieutenant had to confess good-humouredly that he governed 'by permission of Dr Swift.'

Besides his Irish tracts, a good deal of light verse—never rising to the level of true poetry, and often exceedingly coarse—and his *Polite Conversation* (1738), a witty parody of small-talk, and *Directions to Servants*, a savage satire on menial incapacity, Swift's Irish period is notable for the completion of the most famous of all his works: *Gulliver's Travels* appeared in 1726, and was immediately in the mouth of all the world. This immortal satire needs no description or criticism. In it we see Swift's genius in its full maturity, less impetuous and fiery than in the *Tale of a Tub*, but sterner, more earnest, more majestic in its scorn. It is the terrible earnestness of Swift's indignation at the cant and shams of the world that gives his work its unique force and fire. But with all its deadly satire *Gulliver* is a wonderful story-book, and its daring fancy joined to a strange sobriety and plausibility, its bizarre situations, its inherent possibility, and its delightful playfulness make it a classic favourite with children, as well as men, to whom the scourge is more apparent than the jest. Swift's style is here seen in its perfection; pointed and direct, simple, masculine, absolutely free from affectation, logical and lucid, it always says just what it means, with never a word wasted; its shafts hit the mark fair in the centre with unerring precision.

Of his life during his later years a record is found in his voluminous correspondence with English friends like Pope, Gay, Arbuthnot, Bolingbroke, and his Irish crony, Dr Sheridan, to name no more. As letters alone they are quite admirable; but as biographical materials they are priceless. No man was stauncher in his friendships than Swift, and in spite of his bitter moods he hardly ever lost a friend. They were all he had to live for after 'Stella's' death, except his duties and charities among the poor in the Liberties of St Patrick, where he was adored. His life had become very lonely and sad, and he dwelt in constant dread of that mental overthrow which he felt was coming. In 1740 his brain disease drove him to the verge of madness, but after two years clouded by periods of unspeakable torment he sank into a helpless, speechless lethargy, and so gradually faded out of life. The long misery and despair, and lonely exile, and final torpor came to an end 19th October 1745, when the most commanding intellect of his time passed from its dreary prison of imbecility to where, in the words of his own epitaph, his *sæva indignatio cor ulterius lacerare nequit;* and the body of the great dean was laid beside 'Stella,' in the same grave, in the cathedral over which he had reigned for thirty years.

The standard edition of the *Works of Swift* is Sir Walter Scott's (19 vols. Edin. 1814; 2d ed. 1824), which includes most of what was valuable in the earlier collected editions of Hawkesworth and Sheridan, but which stands in need of a thorough revision. Numerous selections from his works have been made; amongst them are those by the present writer, in two volumes, *Prose Writings* and *Journals and Letters* (Parchment Library, 1884 and 1885), with introductions, criticisms, and notes, which have been used in this article; by W. Lewin (Camelot Classics, 1886); by H. Morley (Carisbroke Library, 1889-90); and H. Craik (Clarendon Press, 1892). John Forster published the first volume of an exhaustive *Life of Jonathan Swift* in 1875, which he did not live to complete. The standard biography is that of Henry Craik (1882), and the 'Men of Letters' series contains a skilful Life by Leslie Stephen. References to other authorities will be found in these books. The evidence for the supposed marriage with Stella has been sifted with a lawyer's acumen in *Blackwood's Magazine*, May 1876, by J. Paget, who decides against it. For separate editions of Swift's works, and where preserved, see *Notes for a Bibliography of Swift*, by the present writer (1884). Portraits of Swift are to be seen at the Bodleian Library, Oxford, by Jervas, at the Deanery of St Patrick's, at Howth Castle, in Lord Orrery's *Remarks*, and in Nichol's edition of the works.

Swilly, LOUGH, a long narrow inlet of the Atlantic on the north coast of Donegal, Ireland, enters between Dunaff Head on the east and Fanad Point, on which there is a lighthouse (fixed light visible 14 miles), on the west. A second lighthouse, on Dunree Head, has a fixed light visible for 13 miles. The entrance is protected by forts. Lough Swilly penetrates about 25 miles inland, and has a width of 3 to 4 miles. On the eastern shore is the small town of Buncrana, much resorted to for sea-bathing. On its waters a French fleet under Bompart was destroyed in 1798; and not many years later H.M.S. *Saldanha* foundered at the entrance in a storm.

Swimming. From time immemorial the great usefulness of swimming has been universally acknowledged, and the ease with which the art of supporting the human body in water can be acquired is a statement as old as the hills. The absolute correctness of the assertion that there is no difficulty in the way of the individual who would become a swimmer is open to question, but it is certain that the number of those who surmount all obstacles grows larger year by year. This is due in no small measure to the greatly increased facilities for the pursuit of this most healthful and pleasurable pastime afforded by the erection of many additional and improved public baths; also to the extensive encouragement the sport receives from the numerous swimming clubs in existence. Valuable aid is given to those wishing to know how to swim by such works as Wilson's *Swimming Instructor;* but there is no teaching equal to that which is to be obtained in the water with a proficient as guide. The pupil's every movement is watched, mistakes pointed out, and a bad style avoided—a great thing if one wishes to share in the delights of competition, of which there are now so many opportunities. No greater stimulus was ever given to an art than Captain Matthew Webb gave to swimming when he crossed the English Channel in the water. How stupendous the feat is is explained by the time it occupied. Starting from the Admiralty Pier, Dover, on August 24, 1875, Webb swam or floated for 21 h. 45 m., in which time he reached Calais Sands, where his journey ended. By this feat, the greatest recorded, Captain Webb (drowned in 1883 in his attempt to swim through the Niagara Rapids) made himself for ever afterwards famous. A notable long swim was accomplished on September 2, 1884, by Mr Horace Davenport, who held the title of amateur champion from 1874 to 1879 inclusive, and must be reckoned as one of the strongest of strong swimmers, his mile time in still water, 29 m. 25½ s., accomplished on August 11, 1887, remaining unbeaten by amateurs. Starting from the East Pier, Southsea, Mr Davenport crossed to Ryde Pier and then returned to the Clarence Esplanade Pier, Southsea, without resting, the double journey in a choppy sea occupying 5 h. 25 m. Other long swims, in which it will be seen ladies have played a prominent part, are as follows: 20 miles 3 furlongs, by F. Cavill, 5 h. 51 m., in Thames (with tide), July 8, 1876; 20 miles, Miss Agnes Beckwith, 6 h. 25 m., in Thames (with tide); 18 miles, F. Cavill, 5 h. 58 m., Yarra, Queensland, March 1879; 10 miles, Miss Agnes Beckwith, 2 h. 43 m., in Thames (with tide), July 5, 1876; 10 miles, J. B. Johnson, 2 h. 40 m., Delaware River, United States (with tide),

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August 24, 1875; 9 miles, Miss Emily Parker, 2 h. 24 m. 30 s., in Thames (with tide), September 18, 1875; 5½ miles in the sea at Brighton, Miss Dick, 2 h. 43 m., September 9, 1875; 5 miles, C. Whyte, 1 h. 4 m. 23 s., in Thames (with tide), July 18, 1870; 5 miles, Miss Lizzie Gillespie, 1 h. 20 m. 7 s., in river Tay, Dundee (with tide), August 1880; 2 miles, E. T. Jones, 25 m. 22⅗ s., in Thames, September 10, 1877; 2000 yards, J. B. Johnson, 34 m. 30 s., in Serpentine Lake, August 1873; 1 mile, E. T. Jones, 25 m. 22⅗ s., in Thames, September 10, 1877. The difference between swimming in open water and in a bath is exceedingly great, on account not only of the lower temperature of the former, but also because of the advantage turning and pushing off at each end of the bath gives the swimmer. In Hollingworth Lake on August 23, 1884, J. J. Collier swam a mile in 28 m. 19⅘ s.; at Lambeth Baths (40 yards long) the same swimmer, on October 23, 1885, did the distance in 27 m. 3½ s. Again, it took Collier 15 m. 44 s. to swim 1000 yards in Hollingworth Lake; while at Lambeth Baths, Westminster, the distance was, on October 16, 1890, swum by J. Nuttall in 13 m. 54½ s. The difference in the times for half a mile is comparatively greater; but this may not be so real as the figures indicate. In Hollingworth Lake Collier took 13 m. 46½ s.; at Lambeth Bath the time made by J. Nuttall in 1890 was 12 min. 13⅘ s. The best amateur time for half a mile (13 m. 42⅘ s.) in open water was done by S. W. Greaseley, at Turf, near Exminster, on July 18, 1891. A quarter of a mile was swum by J. Finney in Blackpool Bath in 5 m. 57 s.; at Lambeth Nuttall swam 400 yards in 5 m. 16½ s. 100 yards were swum in 1 m. 3½ s. by J. Haggerty; but the Blackburn Bath in which this was done was only 20 yards long. The best time for Lambeth Baths is 1 m. 6¼ s., made by J. Nuttall on September 24, 1888. It took him 1 m. 12 s. to cover a like distance in Hollingworth Lake.

Until April 7, 1886, a much disputed question was the length of time a person could remain under water. On the date given J. Finney, in a tank at the Canterbury Theatre of Varieties, London, remained below the surface 4 m. 29¼ s., which time will probably never be equalled, the nearest approach to it being 3 m. 18¼ s. on September 27, 1889, by Miss Annie Johnson. Finney also has swum 113 yards 1 foot in costume under water. This he did on October 20, 1882, at Blackpool, in a bath 28 yards 1 foot long. The best plunge or standing dive, the body, which has to be kept face downwards, having no progressive action imparted to it other than the impetus of the dive, stands to the credit of G. A. Blake, who on October 10, 1888, at Lambeth Baths, did 75 feet 7 inches. Among other remarkable performances may be mentioned those of T. Burns, who dived from Runcorn Bridge (85 feet) in October 1889, and then swam to Liverpool, from whence he walked to London and dived off London Bridge; and J. Finney, who, at Manchester on April 30, 1890, with his mouth picked up seventy-five coins from the bottom of a tank, his hands being tied behind his back.

See such works as Wilson's *Swimming Instructor* (1883), or Cobbett's *Swimming* (1889). See also the articles CRAMP, RESPIRATION (ARTIFICIAL), DROWNING, and HUMANE SOCIETY.

Swinburne, ALGERNON CHARLES, was born in London on April 5, 1837, but belongs to a Northumbrian family, being the son of Admiral Swinburne and of Lady Jane Henrietta, the daughter of the Earl of Ashburnham. He was educated at Eton and at Balliol College, Oxford, which he entered in 1857 and which he left without taking a degree. He then spent some time in travelling on the Continent, and in 1864 he visited Walter Savage Landor at Florence. On his return to England he became closely associated with Dante Rossetti and William Morris, and his life has thenceforth been that of a man of letters and has been mainly spent in London. His first book, a tragedy entitled *The Queen Mother and Rosamund*, was published in 1861, but did not excite much attention. It was otherwise with *Atalanta in Calydon*, which appeared in 1864, and proved that a new singer with an exquisite lyrical gift had arisen. Mr Swinburne has produced no poem of similar length so full of beauties as *Atalanta;* and there are some, and these, perhaps, not the least competent judges of his verse, by whom this drama is even now more dearly prized than any other of its author's works. The tragedy of *Chastelard* was deservedly far less successful, and in 1866 the first series of *Poems and Ballads* awakened a storm of adverse criticism. The outcry was in the main unjust; but one or two of the pieces had better not have been written, and the language of others was now and then such as to give a colour of plausibility to the strictures passed on the book. The finest pieces, *Hesperia*, *Itylus*, *A Match*, *The Garden of Proserpine*, the *Hymn to Proserpine*, *The Triumph of Time*—these, to name but these, were a revelation to students of English verse. The writer struck a note which none had struck before. You might object, and now and then rightly object, to the erotic tone of certain passages, but there was no resisting the lyric fire and the consummate artistry, the magnificence of the rhythm, the new, strange sweetness of the music. *A Song of Italy* appeared in 1867 and an *Ode on the Proclamation of the French Republic* in 1871. By the publication in the latter year of *Songs before Sunrise* Mr Swinburne was again exposed to censure, extravagant in part and in part not unmerited. There is much admirable verse—fiery and ringing and technically perfect—in the volume; it contains, however, no such fascinating masterpieces of lyric art as the best of the *Poems and Ballads*, and to most readers the political opinions held by Mr Swinburne at the time of its composition will appear to be visionary and crude, and to be often intemperately urged. In 1871 Mr Robert Buchanan attacked Dante Rossetti and Mr Swinburne on the score of the alleged immoral tendency of their verse; the accuser's pamphlet, *The Fleshly School*, drawing forth a counter pamphlet, *Under the Microscope*, from Mr Swinburne. *Bothwell*, a long chronicle play, without any attempt at theatric structure, in which historic truth, so far as understood by the poet, was made the primary quest, appeared in 1874; *Erechtheus*, a noble lyric drama, extremely unlike *Atalanta*, inasmuch as it was written with great exactitude (even as to the number of its verses) upon the lines of a Greek drama, in 1875; and a second series of *Poems and Ballads* in 1878. Since then their author has issued *Songs of the Springtides; Songs of Two Nations; Studies in Song; A Century of Roundels; Marino Faliero; Locrine*, a rhymed tragedy; *Tristram of Lyonesse*, a fine narrative poem in decasyllabic couplets; *Mary Stuart*, a play completing the trilogy begun in *Chastelard* and continued in *Bothwell;* and a third series of *Poems and Ballads*, containing the superb sea-and-battle piece, *The Armada*, in 1887. *The Sisters*, a short tragedy of modern life, published in 1892, was less favourably received than any of his previous works. Mr Swinburne's prose works include two volumes of critical essays (on Byron, Shelley, Coleridge, Rossetti, Tennyson, Musset, &c.), and separate studies of William Blake, George Chapman, Ben Jonson, Charlotte Brontë, Hugo, and Shakespeare. He has one pre-eminent excellence as a critic, the faculty of discerning and giving the most generous recognition to literary merit in its most dissimilar forms—in Congreve as in Wordsworth,

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in Pope as in Webster, in Anthony Trollope as in Cyril Tourneur. The genius of Victor Hugo, however, has been unto him even as a siren, his idolatry of the great romanticist not only finding expression in immoderate eulogy, but prompting him now and then to belittle the works of other poets—most notably those of Alfred de Musset. The merits and defects of his prose style were at first almost equally striking. He abused his magnificent command of epithet, he was super-emphatic, and he frequently employed figures which are only admissible in verse. These defects are much less conspicuous in his later essays, and in his finest passages it would be hard to excel the splendid glow and ornate grace of the diction and the stately mould of the sentences.

Mr Swinburne is the greatest metrical inventor in English literature. Other poets have equalled him in melody, but none other has revealed the tunefulness and pliancy, the majesty and grace of the English speech in such a variety of lyrical forms. He can impart dignity and distinction to the simplest measures, and move with faultless ease in the most elaborate. He can take a thing like the roundel, a form which seemed to be only adapted for ingenious trifling, and render it a sonorous instrument for brooding thought or impassioned imagination. He can give rapid and graceful movement to heavy-laden, long-drawn metres which other artists in verse would find unworkably cumbrous. He can stir the blood by the rush and resonance of a battle-chorus, or charm the ear by the music of a love-lyric as sweet as the songs of spring. His music is like no other man's, and whether the verses are running lightly, marching proudly, or swinging impetuously, the music is alike irresistible. He has been accused of tautology and obscurity, and even of drowning sense in sound. He has no doubt a tendency to use redundant phrases and unfamiliar inversions, and to carry alliteration to excess. But the charge of obscurity has been generally urged in ignorance of his aims and from misappreciation of his craftsmanship. With the possible exception of Gérard de Nerval, he is the modern poet whose aims and methods approach most closely to the musician's. Vague Mr Swinburne sometimes is; but he is so most often of artistic intent. Words which may at first seem pleonastic and even meaningless are discovered on further reading to have been inserted with delicate art to deepen the impression of mystery or beauty which the writer sought to suggest by the verbal music of a given passage. In dealing with nature his endeavour is not to produce a minute transcript, but to render the spirit of a scene, to catch and convey the elusive haunting secret of its loveliness or its terror. *The Garden of Cymodoce* admirably illustrates his descriptive method. You feel at first as if the meaning of certain phrases were escaping you; but as you read, the charm, at once daunting and seductive, of the wonderful sea-hall—the magic of the lovely crimson glimmer and of the gloom which seems to dilate above the black silent water—is borne in upon you by the suggestion of the music, the subtle verbal colouring and shading, the premeditated vagueness of certain lines, as it could never have been by any number of direct and minute descriptive touches. The poem is as perfect in one way as Keats's *Hymn to Pan* is in another. Of all our poets Mr Swinburne is the poet of the sea. He knows the ocean in all its moods; he has rendered with equal perfection the revel of storming surges, the magnificent rolling of deep-sea billows, the soft glow of the bowers of the water-world, the sensuous delight of a swimmer swimming out as the morning breaks over the green rippling deep. His versatility has not yet gained due recognition. He has dealt with the most various subjects and drunk inspiration from the most various sources; he has worked as a lyric, a narrative, and a dramatic poet; in style he has ranged from the most ornate manner to the most austere. None of his later volumes can awaken the delight with which his readers greeted the outburst of soaring song and lyric fire in *Atalanta*. The joy of that surprise can never be renewed. And in splendour of rhythm, in witchery of phrase, in passionate imaginative glow the last series does not and could not well surpass the first series of *Poems and Ballads*. But in nobility of aspiration, width of sympathy, and bracing love of nature the advance is indubitable. In the early poems (saving *Atalanta*) the air was too often as that of a hothouse; it was enervating to linger in the society of Felice and Yolande and Juliette. But the old languor and pessimism have passed away; the mournful amorist of the *First Series*, the indignant rebel of *Songs before Sunrise*, has become the exultant singer of the sea and the sea-wind, the high-hearted lyrist of the great deeds and imperial destiny of England. In the early poems we were transported to the clear-cut, clear-coloured hills of Greece and the drowsy garden-closes of the south; in the latest we hear the night-wind rushing over the 'mirk muir sides' of the Scottish Border and the Tyne roaring in spate. Mr Swinburne's plays, setting aside *Atalanta*, are of far inferior importance to his lyrics, though they contain noble passages of poetry, and though in one character, his Mary Stuart, he has achieved a triumph of dramatic creation. It is as a lyrist in some ways unsurpassed that Mr Swinburne will keep a place in English literature.

Swindling. See FRAUD.

Swindon, a town of Wiltshire, 77 miles W. of London and 29 ENE. of Bath, consists of Old Swindon (*Swindune* in Domesday), on an eminence 1¼ mile S., and New Swindon, which originated in the transference hither in 1841 from Wootton-Bassett of the engineering works of the Great Western Railway. The former is rather a picturesque place, with a good Decorated parish church (rebuilt by Sir G. G. Scott in 1851), a town-hall (1852), assembly rooms (1850), and a corn exchange (1867); New Swindon has a mechanics' institute (1843), a theatre, &c. Pop. (1861) 6856; (1881) 22,374; (1891) 32,840 (5545 in Old Swindon).

See J. E. Jackson's *Swindon and its Neighbourhood* (1861), and the *English Ill. Mag.* for April 1892.

Swine. See PIG.

Swinemünde, a fortified seaport of Prussia, on Usedom Island, at the entrance of the narrow channel of Swine, connecting the Grosses Haff (into which the Oder flows) with the Baltic. It is yearly entered by nearly 500 vessels of 229,000 tons burden (one-third British), and has valuable fisheries and excellent sea-bathing. Pop. 8626.

Swing, a cognomen assumed by senders of threatening letters during the period when the irritation of the agricultural labourers of England against their employers was at its height, namely from 1830 to 1833. The cause of this misunderstanding arose from a wide-spread belief on the part of the labourers that the use of machinery would greatly lessen the demand for labour, and consequently produce a general reduction of wages; it was also intensified by the savage severity with which the game-laws were enforced, and by other hardships to which the labouring classes in the country considered themselves unjustly subjected. As disregard by landlords or farmers of the demands contained in these threatening letters was constantly followed by the burning of stacks and farm-buildings, the employers of labour became so

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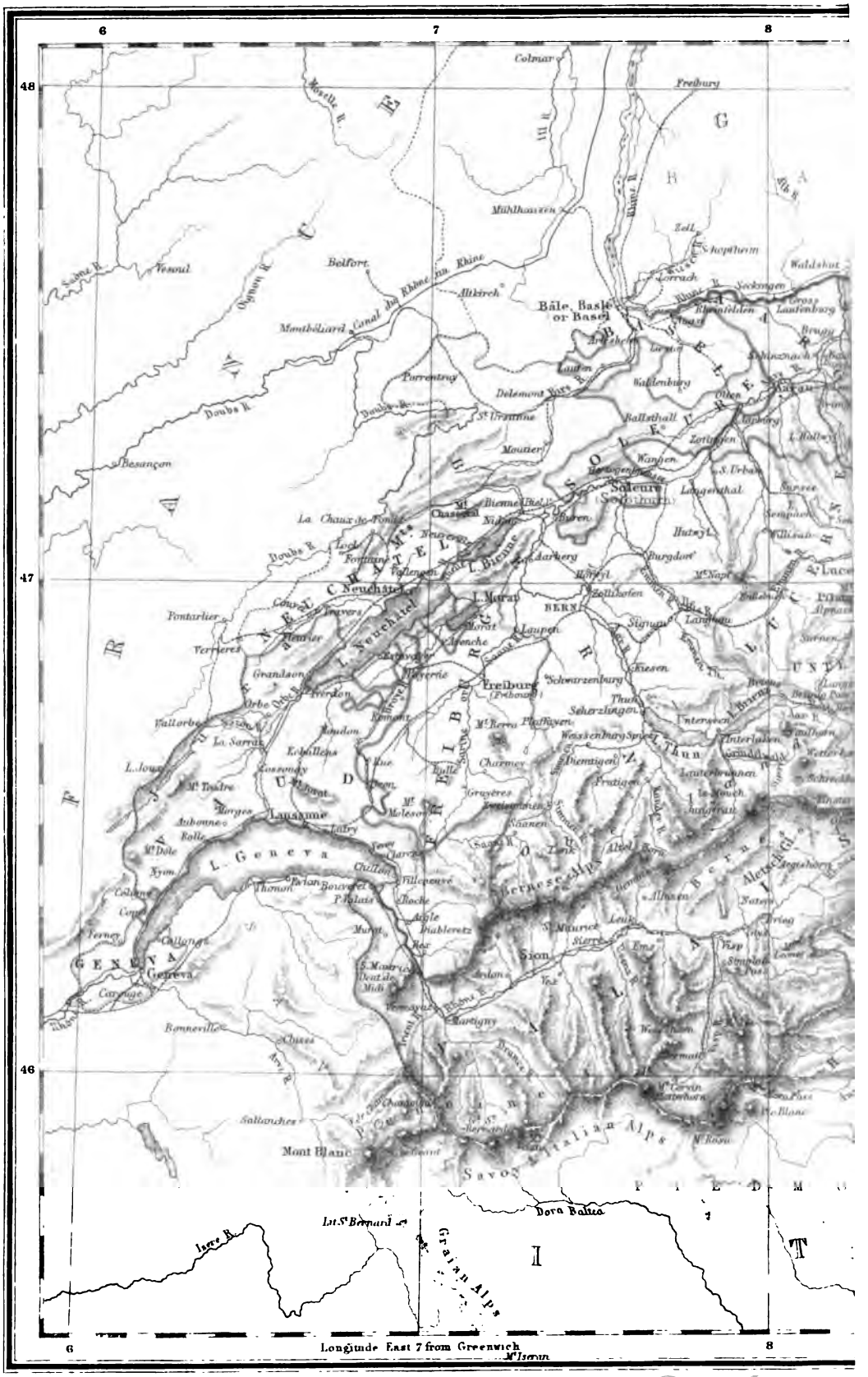

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Switzerland. The republic of Switzerland is a confederation of twenty-two cantons, three being divided into half-cantons, situated in the centre of Europe between France, Germany, Austria, and Italy. The greatest length from east to west is 216 miles, the width from north to south being 137 miles; area, 15,981 sq. m. The population in 1850 was 2,392,740; in 1870, 2,669,147. The following table (arranged in alphabetical order) gives the results of the census of 1888. The German name is put first, followed by the French name in the German cantons, and conversely in the French ones. F. or G. or F.G. indicates that the language of the majority is French, or German, or both. When neither F. nor R.C. is appended, it is to be understood that the canton is partly Protestant and partly Catholic.

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Cantons.	Admitted to the Confederation.	Area in sq. m.	Pop. in 1888.
Aargau (Fr. Argovie), G.	1803	548	198,884
Appenzell—			
Outer, G., P.	1513	168	54,200
Inner, G., R.C.			12,906
Basel (Fr. Bâle)—			
Town, G., P.	1501	178	74,247
Country, G., P			62,133
Bern (Fr. Berne), G.	1353	2,659	589,305
Fribourg (Ger. Freiburg), F.G., R.C.	1481	644	119,562
Geneva (Fr. Genève, Ger. Genf), F.	1814	108	106,788
Glarus (Fr. Glaris), G., P.	1352	267	33,800
Graubünden (Fr. Grisons), G.F.	1803	2,754	96,291
Luzern (Fr. Lucerne), G., R.C.	1332	579	135,780
Neuchâtel (Ger. Neuenburg), F.	1814	312	109,087
St Gallen (Fr. St Gall), G.	1803	779	229,441
Schaffhausen (Fr. Schaffhouse), G., P.	1501	114	37,876
Schwyz, G., R.C.	1291	351	50,396
Solothurn (Fr. Soleure), G., R.C.	1481	306	85,720
Thurgau (Fr. Thurgovie), G.	1803	381	105,091
Ticino (Fr. and Ger. Tessin), Ital.	1803	1,089	127,148
Unterwalden—			
Upper, G., R.C.	1291	295	15,082
Lower, G., R.C.			12,524
Uri, G.	1291	416	17,284
Valais (Ger. Wallis), F.G.	1814	2,086	101,887
Vaud (Ger. Waadt), F.	1803	1,244	251,296
Zug (Fr. Zoug), G., R.C.	1352	92	23,120
Zürich (Fr. Zurich), G., P.	1351	666	339,014
Total		15,981	2,933,612

Surface.—The area of Switzerland (15,981 sq. m., of which 11,443 are classed as 'productive' and 4538 as 'unproductive') is distributed over four river-basins—those of the Rhine, the Rhone, the Inn, and the Ticino, a tributary of the Po. The Confederation is bounded on the S. by a part of the main chain of the Eastern Alps, running from south-west to north-east, on the W. and NW. by the Jura, and on the N. by the Rhine. The Pennine Chain of the Alps lies to the south of the valley of the Rhone, on the north of which valley are the Bernese Alps extending from the Lake of Geneva to the Grimsel. East of the Bernese Alps is the St Gothard group, with its ramifications in the direction of Lucerne and Glarus. The Rhætian Alps are east of the Pennine Chain. A broad fertile plain extends from the Lake of Geneva to the Lake of Constance. The lowest level on Swiss territory is 646 feet on the banks of Lake Lugano; the highest is 15,217, the summit of Monte Rosa. Of the 4538 sq. m. of land classed as 'unproductive' 3229 are covered by rocks, moraine, &c., 711 by glaciers, 535 by lakes, and 63 by towns and villages. The largest lakes in Switzerland are those of Geneva and Constance; there are fifteen which cover an area of over 3 sq. m. each. There are numerous waterfalls, the highest (1002 feet) being the Staubbach in the Bernese Oberland. The Falls of the Rhine at Schaffhausen are upwards of 80 feet in height, and have been called a 'miniature Niagara.' There are about 470 glaciers, the largest being the Gross Aletsch, 15 miles in length. In Valais a greater surface is covered by glaciers than in any other canton; there are, however, no glaciers in eleven cantons. In the Central Alps the limit of perpetual snow varies from 9250 to 9020 feet.

Geology.—The geological structure, assisted by denudation, gives the country its picturesque character. In the south the chain of the Western and Central Alps consists of a series of crystalline masses lying south-west and north-east, covered on the northern slope by sedimentary rocks belonging to the Triassic, Jurassic, and Cretaceous formations. These coverings of sedimentary rocks are much folded, and overlap, forming limestone cliffs (Wetterhorn, Eiger, Jungfrau, &c.). To the north is the Jura range, a chain of regularly folded and anticlinal hills with longitudinal valleys often intersected by ravines. The wide plateau between the Jura and the Alps consists of tertiary deposits of sandstone and clay, partly lake and sea deposits; it is covered also by deposits of ancient glacier-moraines and gravels of the last glacial epoch. Few metallic deposits are to be found in Switzerland; those which exist cannot be worked owing to the irregularity of the veins. In Valais there are coal-formations metamorphosed into crystalline rocks, the coal being changed into anthracite of very irregular size. Salt is obtained in the valley of the Rhine at Rheinfelden. See ALPS, JURA, &c.

Climate.—In a country where the height above the sea-level is from 646 feet—where the almond, the fig, and the olive ripen in the open air—to 15,217, the region of perpetual snow, there is great variety in the climate. There is a variation of about 34½° in the mean temperature; at Bellinzona it is 54½° F.; at Geneva, 49½°; Interlaken, 48½°; at the Hospice on the Great St Bernard it falls to 30°, and on the Theodule Pass to 20°.

Language.—The population is composed of four distinct ethnical elements. The language of 71·3 per cent. of the population (2,092,479) is German; of 21·8 (637,710), French; of 5·3 (156,482), Italian; of 1·6 (46,941), Romansch or Ladin.

Religion.—By the federal constitution liberty of conscience and belief is declared to be inviolable, and the free exercise of worship is guaranteed within the limits compatible with public order and decency. No bishopric can be established in Switzerland without the consent of the Confederation. There is no federal church, each canton has its own ecclesiastical constitution and organisation, and the majority of the citizens can dispose of the church funds (derived from a variety of sources) belonging to each canton. By the census of 1888, 1,724,869 (58·8 per cent.) are Protestants, 1,189,662 (40·5) are Catholics, 8384 (0·3) are Jews, and 10,697 (0·4) belong to other confessions.

Constitution and Government.—The republic of Switzerland became a federal state (*Bundestaat*) in 1848: previously it consisted of a league of semi-independent states or cantons. The present constitution, based on laws passed in 1848 and revised in 1874, was constructed with the view of satisfying both cantonal and national elements, and is therefore essentially a work of compromise. It is the first constitution which was entirely the work of the Swiss without foreign influence, although its authors studied that of the United States. The political structure of Switzerland is built up in three tiers—the Commune, the Canton, and the Federal Assembly. In the communes all local matters are administered by two governing bodies—the Communal Assembly (which is purely legislative), composed of all male citizens who have attained the age of twenty, and the Communal Council, the executive of the former body, by whom it is elected. Each canton has its own constitution and local government. The constitutions of the several cantons vary considerably, but

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all are based on the principle of the absolute sovereignty of the people, subject to certain restrictions chiefly regarding military and legal matters imposed by the federal constitution: they are subject also to the ratification of the Confederation. In Uri, the two half-cantons of Appenzell, and in Glarus there still exists the ancient *Landsgemeinde*, an open-air gathering of all those possessing votes, who meet every spring to legislate on cantonal affairs. These cantons possess a representative power in their *Landrath*, and an executive power in the *Regierungsrath*. In other cantons the citizens elect representatives to the cantonal council from electoral districts. The citizen of a commune is *ipso facto* citizen of the canton in which his commune is situated, and therefore votes in the election of the cantonal council. In the majority of cantons this body choose from among their own number an executive, who superintend all cantonal affairs and the government of the communes; the members also transact business with the federal government and with that of other cantons. The supreme legislative authority of the Confederation is vested in a parliament of two chambers, the Council of the States (*Ständerath*) and the National Council (*Nationalrath*), which represent the supreme government of the country, under reserve of the *referendum* or vote of the people. The Council of the States consists of forty-four members, each canton having two representatives, and each half-canton one. The regulations as to their election and duration of term of office differ in each canton. The National Council consists of 147 members, elected in each canton in the proportion of one deputy for every 20,000 of the population. The electoral districts cannot be made up of parts of different cantons, and are fixed by the Federal Assembly after every census; the election takes place once every three years. Every male who has attained the age of twenty and possesses the rights of citizenship according to the constitution of his canton, is entitled to vote, and any voter other than a clergyman or an official appointed by the Federal Council is eligible for election as a representative. The sum of 16s. a day is paid during session to the members of the Council of the States and the National Council. These two chambers each elect a president and vice-president, and meet at Berne at least twice a year in June and December, together forming the Federal Assembly. This body controls the general administration of the Confederation; they alone can declare war, make peace, or conclude treaties with foreign powers. The executive authority of the Federal Assembly is deputed to the Federal Council composed of seven members, elected for a period of three years and each receiving a salary of £480 per annum, except the president, who receives £540. No canton can have more than one citizen in this council; its duties are divided among seven departments, one member being charged with the direction of each. The president of the Federal Council, who is also president of the Confederation, is chosen annually at a united meeting of the Council of the States and the National Council from among the members of the Federal Council. The president and the vice-president (who is chosen at the same time) are elected for one year, and cannot be re-elected within twelve months of the expiration of their term of office.

Referendum and Initiative.—These are two political institutions peculiar to Switzerland, the furthest developments of democracy yet attained. In 1831 an article was introduced into the constitution of St Gall, declaring 'the sovereignty of the people, who have the right not only to pass their own laws, but also to veto them.' This paved the way for the *referendum*, which has now spread throughout the whole Confederation, and by means of which all legislative acts passed in the Federal or Cantonal Assemblies may be referred to the people *en masse*. It is of two kinds, compulsory and optional, both as regards federal and cantonal matters. In those cantons where all laws adopted by the representative body of the canton must be submitted to the people it is compulsory; in those cantons where it may be demanded by a certain number of votes it is optional. With the exception of Freiburg, cantonal *referendum* exists in those cantons where there is no *Landsgemeinde*. In the majority of cantons 5000 signatures are required in order to obtain a *referendum* for cantonal laws. The compulsory *referendum* regarding federal legislation was established in 1848, but was then limited to the revision of the constitution. That of 1874 contains an article extending the exercise of the popular vote, when demanded by 30,000 citizens or eight cantons, to all laws and resolutions of a general nature passed by the Federal Assembly, this being the optional form of the federal *referendum*. Since the *referendum* was fully developed in 1874 it has been put in operation on an average once a year; the decisions have generally shown a conservative rather than a radical tendency on the part of the people.

Initiative is the exercise of the right granted to voters to initiate proposals for the enactment of new laws or for the alteration or abolition of old ones. By this means the 'sovereign people' have always the power to bring forward the discussion of legislative matters, even in the event of their representatives in the government being unwilling to do so. Fifty thousand signatures are required to obtain the initiative regarding federal legislation, and in the majority of cantons 5000 for cantonal matters.

Law and Justice.—With the exception of the Federal Bankruptcy Act, applicable throughout the whole of the Confederation, the procedure in civil and criminal matters varies in the different cantons. In the French cantons, with the exception of Geneva, the civil codes are based upon the *Code Napoléon*, while in the German cantons they differ considerably from each other, and are for the most part original. In Uri and Appenzell there exists not only a code, but customary laws, to which the court gives effect. In ten cantons representing twenty per cent. of the entire population capital punishment exists. By the federal constitution, 'no sentence of death can be pronounced for a political offence.'

Revenue and Expenditure.—The revenue is derived chiefly from the postal and telegraph services, the customs, powder manufactories, the tax for exemption from military service, and from the real property of the confederation; which together for some years past have produced an income of about £2,500,000. The estimated revenue for 1891 was £2,625,520, the expenditure being reckoned at £3,122,760; the deficit of £497,240 caused by the new armament of the troops and the construction of the fortifications on the St Gothard is covered by a federal loan (1889) of £1,000,000. The public debt in 1891 amounted to £2,166,000. There are two 3½ per cent. loans of £240,000 (made in 1885) and of £2,760,000 (in 1890), the latter sum being invested in the shares of the largest Swiss railways, from which the Confederation obtains 4½ per cent., and thus makes a certain profit. Each canton has its own budget of revenue and expenditure. The total cantonal debts do not exceed £11,096,400. The French metric system of money, &c. is in use throughout the Confederation.

Army.—The federal constitution forbids the maintenance of a standing army; still it declares

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that 'every Swiss is liable to military service.' The army is therefore essentially a citizen force drawn from all classes of the people, being intended only for defensive purposes and to secure the neutrality of the country. It is divided into three classes—the *Élite* or active army, in which all citizens are liable to serve from the age of twenty to thirty-two; the *Landwehr*, from thirty-two to forty-four; and the *Landsturm*, consisting of men from seventeen to fifty not incorporated in the two former classes. Every Swiss keeps his rifle and kit, and in the case of a cavalry soldier his horse, at his own home. Cavalry recruits provide their own horses, which they may use for agricultural or other purposes during the remainder of the year; one-tenth of the price is refunded annually by government. The total strength of the army, not including the *Landsturm*, is: *Élite*, 125,620; *Landwehr*, 80,715; total, 206,335. With the exception of the heads of the ordnance departments, the General Staff and the Corps of Instructors—about 200 in number—are the only officers permanently paid and employed.

Education.—Primary instruction is compulsory, unsectarian, and is provided gratuitously at the cost of each canton, whose officials control the administration and inspection of the schools; thus the details of organisation vary considerably in the different cantons. The period of compulsory attendance is usually from the age of five or six up to fourteen, fifteen, and even sixteen. In many cantons those children who do not enter the secondary schools must pass into the supplementary ones, which generally meet twice a week, the aim of the teachers being to help the scholars to retain what they have learned in the primary schools. There are five universities on the German model—Basel, Bern, Zurich, Geneva, Lausanne, and (for Catholics only) Freiburg; there is also an academy at Neuchâtel, which does not, however, possess the four faculties. The Polytechnic at Zurich is a technical college under the control of the federal authorities, attended by 900 students, the annual cost of maintenance being £20,000. The most important technical schools are the Technikum at Winterthur, those of silk-weaving at Zurich, watchmaking at Geneva, La Chaux de Fonds, Neuchâtel, &c., and wood-carving at Meyringen. Practical as well as theoretical instruction in agriculture is given in the farm-schools at Strickhof and Rütte, and during the winter months short courses of lectures are given gratuitously in the rural districts on horticulture, vine-growing, cattle-breeding, &c.

Agriculture, &c.—All the land in the Confederation is freehold, the cost of transfer in each canton being extremely moderate. More than one-half of the arable land is devoted to cereals; still in 1889 flour to the value of £3,907,550 was imported. Cattle-breeding is an industry of great importance. The Swiss possess two excellent breeds, the parti-coloured and the brown. The former are amongst the heaviest in Europe, the milk being admirably adapted for making cheese and butter. The brown race is a medium-sized breed, its headquarters in Schwyz, Lucerne, and Zurich. There are upwards of 5500 cheesemaking establishments, and the following are the exports in connection with this industry: cheese, worth £1,561,191, to France, Italy, Germany; condensed milk (£438,071) to Great Britain; and butter (£50,742) to France. Tobacco is grown chiefly in the cantons of Valais, Vaud, Freiburg, Bern, and Aargau; the quality is by no means good, but the exports (including cigars and cigarettes) amount to £90,000 a year. The vine flourishes best on the slopes surrounding the lakes of Geneva, Neuchâtel, Biel, and Zurich. The average annual production of wine amounts to 31,266,400 gallons; but about 15,400,000 gallons are annually imported, exceeding the exports by 11,000,000.

Commerce.—Little or no coal is to be found in the Confederation, there are no canals or navigable rivers, the country is situated far from the seacoast, and nearly the whole of the raw material and half-finished goods have to be imported. Still, in spite not only of these drawbacks but of the protective policy adopted by the neighbouring powers, there is a larger general trade per head of the population than in almost any other European country, amounting to £13, 0s. 2d. for imports and £9, 13s. 6d. for exports. In 1889 the imports amounted to £38,169,145, and the exports to £28,435,794; while if we include the transit trade the totals are £61,302,925 for imports and £51,119,401 for exports. The trade for 1890 with the principal countries was:

	Imports.	Exports.
Germany	£10,800,075	£7,884,249
France	10,492,092	5,691,241
Italy	5,632,180	2,057,484
Austria-Hungary	4,259,629	1,541,862
Great Britain	2,081,239	4,238,008

The textile industries are the most important, the chief centres being Zurich, Basel, Glarus, and St Gall, the total value of the goods exported being £16,292,954. Next comes the watchmaking industry, established at Geneva in 1587, and which has since spread to the cantons of Neuchâtel, Bern, and Vaud. The value of the watches, musical boxes, &c. exported in 1889 amounted to £3,949,728. The production of machinery (weaving-looms, &c.) is valued at £1,200,000. Embroidery is carried on chiefly in St Gall and Appenzell. Wood-carving, introduced in the Oberland about 1820, now gives employment to about 4000 persons. The gross amount of money brought annually by tourists into the 'Play-ground of Europe' is estimated at £4,000,000.

History.—The occupants of the Lake-dwellings (q.v.) were the first inhabitants known to us. At the time of the Roman invasion the two principal tribes in possession of the country were the Celtic Helvetii and the Rhætii (of doubtful affinities). In 58 B.C. the Helvetii were partially subdued by Julius Cæsar, but it was not till 15 B.C. that they were completely subjugated by Augustus. These became part of the Roman empire, and during the three following centuries trade was developed and military roads were constructed, e.g. the St Gothard, the Great St Bernard, and that crossing the Julier. The chief Roman settlements were *Aventicum* (Avenches), *Augusta Rauracorum* (Kaiser Augst) and *Vindonissa* (Königsfelden). After the conquest of Gaul Helvetia was invaded by the Burgundians and the Alemanni 450 A.D. The former took possession of western Switzerland, and the latter settled east of the Aar, in the district since known as 'La Suisse Romande.' In the 7th century, during the domination of the Frank kings of the Merovingian dynasty, order was restored, and Christianity preached by SS. Gallus, Columbanus, and others. About this period the great monasteries of Einsiedeln, Dissentis, St Gall, and Pfäffers were founded, which soon became centres of progress and learning. Much of what later became Switzerland then formed part of the Holy Roman Empire, for which it was ruled by wealthy abbots and nobles, among whom were the Counts of Zähringen. This powerful family became extinct in 1218, and the country was distracted by internal wars. In 1273 Rudolph of Hapsburg (whose castle was situated in what is now the canton of Aargau) was raised to the imperial throne; after his death (1291) a short period of anarchy ensued in the empire. The inhabitants of Uri,

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Schwyz, and Unterwalden then felt the necessity of joining together in order to defend their common interests. The Confederates (*Eidgenossen*) did not, however, throw off their allegiance to the emperor; their hostility was rather directed against the despotic power exercised by the bailiffs or middlemen, some of whose acts of tyranny have been described in Schiller's *Wilhelm Tell*, which is founded on the legends belonging to that period (see TELL). Out of this defensive alliance sprang that pact which constituted the germ of the present Swiss Confederation, but which from 1291 to 1874 has passed through seven distinct phases—viz.: (1) The League of the Three Communities, 1291; (2) The Confederation of eight cantons, 1353; (3) The Confederation of thirteen cantons, 1513; (4) The Helvetic Republic, 1798; (5) The Act of Mediation, with nineteen cantons, 1803; (6) The Federal Pact, with twenty-two cantons, 1815; (7) The Federal Constitution of 1848, revised in 1874.

In 1307 it is stated that Werner Stauffacher of Schwyz, Walter Furst of Uri, and Arnold of the Melchthal in Unterwalden (representatives of the three leagued cantons) met together in the meadow of Grütli by the Lake of Lucerne, and took an oath to free their soil from the Austrian oppressors. They swore that they would be 'all for each, and each for all,' which still remains the motto of the Confederation Five years later the Confederates were called upon to vindicate this oath, and defend their country against Leopold of Austria. In 1315, while marching at the head of a powerful army through a defile beneath the heights of Morgarten, he was surprised by the Swiss, who hurled down stones and trunks of trees, completely routing their opponents. In 1332 Lucerne joined the alliance of the Three Communities, and the League was increased to four Forest States or Cantons (*Vierwaldstätten*). Bern and Zurich had become imperial fiefs, and the growing importance of the former excited jealousy in western Switzerland, with the result that in 1339 a large force laid siege to Laupen, but were defeated by the Bernese under Rudolph von Erlach. By 1353 Bern, Zurich, Glarus, and Zug joined the Confederation, which thus attained its second phase of eight cantons. The Austrians were again routed at Sempach in 1386, and in 1388 at Näfels; and subsequently in 1393, with the view of strengthening the federal sovereignty, the confederates drew up the document known as the 'Convention of Sempach.' The Swiss were next engaged in a struggle on the French frontier with Charles the Bold; they defeated him at Grandson in 1476, again at Morat, and finally in 1477 before the walls of Nancy, where Charles himself was slain. The unequal distribution of the booty taken at Grandson and Morat occasioned much jealousy between the five rural states or cantons and the cities of Zurich, Bern, and Lucerne; the dissolution of the Confederation seemed imminent, but owing to the intervention of Nicholas von der Flüe an understanding was effected at the Diet of Stanz in 1481, laws were made as to the admission of new cantons, and separate alliances between them were prohibited. By 1513 Freiburg, Solothurn, Basel, Schaffhausen, and Appenzell were added to the Confederation, this being the third phase of its history. In addition to these were associated and protected states, as well as subject territories, belonging to one or other of the various cantons. Valais, the Grisons, Geneva, Biel, and Mühlhausen were republics. The principality of Neuchâtel, the lands of the Abbey of St Gall, and the bishopric of Basel were ruled by lay or ecclesiastical sovereigns.

The 16th century saw the rise of Protestantism. Zwingli led the van in Zurich, whence the Reformation spread, first to Bern and then northwards; the Forest Cantons, with Zug, Freiburg, and Solothurn, however, remained faithful to the Church of Rome. In 1531 war broke out between the Protestants and Catholics, and at the battle of Kappel, where Zwingli was killed, the Zurichers were defeated by the Forest Cantons. The episcopal and imperial city of Geneva, which had allied itself with Bern and Freiburg against the Dukes of Savoy, became a republic in 1535, and accepted a new civil and ecclesiastical legislation under Calvin. In the following year the Pays du Vaud, long subject to the Dukes of Savoy, was conquered by Bern; the inhabitants became Protestant, and the Reformed doctrines spread into western Switzerland. During the Thirty Years' War Zurich and Bern successfully helped to maintain the neutrality of Switzerland, and by the treaty of Westphalia in 1648 the country was acknowledged by the great powers as an independent state. Bern, since the conquest of Vaud, had become the most powerful canton; the wealthy inhabitants of that city constituted themselves into a close corporation or guild, to which no new members were admitted, and, as in Lucerne, Freiburg, and Solothurn, all official posts were in the hands of the patrician families.

Zurich, Basel, and Schaffhausen were 'semi-aristocratic' cantons, the burghers having a share in the elections, from which, however, the country-people were excluded. The remaining six cantons ruled themselves in the *Landsgemeinden* or popular assemblies. The internal state of the cantons, however, owing in many cases to a tyrannical administration, showed a need of reform. The subject-territories had particularly to complain of the arbitrary conduct of the bailiffs by whom they were ruled, as well as of the inequality which existed between the inhabitants of town and country. It only required the impetus imparted by the French Revolution to produce a wide-spread rising in Switzerland. In 1798 Vaud declared its independence against Bern, and a French army came to her aid. In other parts of Switzerland similar outbreaks occurred; the French routed the troops of the Forest Cantons and those of the Bernese under General von Erlach at Fraubrunnen and Grauholz, the city of Bern was taken, and the ancient Swiss Confederation came to an end.

Till 1798 there had simply been alliances between the different cantons; no real constitution existed, and the establishment of the Helvetic Republic (the fourth phase of the Confederation) was the first attempt at a federal constitution. It was extremely unpopular; not only was it imposed by foreign pressure, but it was against the traditions of the Swiss people. The whole country was torn by two hostile factions till 1803, when Napoleon summoned representatives from both parties to Paris, and gave Switzerland a new constitution, termed the Act of Mediation. St Gall, the Grisons, Aargau, Thurgau, Ticino, and Vaud were added, making nineteen cantons in all, this being the fifth phase of the Confederation. The downfall of Napoleon brought with it the destruction of his work in Switzerland, whose perpetual neutrality as well as the inviolability of her territory was recognised by the congress of Vienna in 1815. Valais, Neuchâtel, and Geneva, which had been annexed to France under the Directory, were added to the existing cantons, which thus became twenty-two in number; each of them was represented at a diet which met alternately at Bern, Zurich, and Lucerne. The decline of the Bourbons had, too, its echo in Switzerland; the patrician families lost the ascendency they had regained at the beginning of the century, and many of the cantonal constitutions were revised, with the result that the power of the people was greatly increased.

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Basel, in spite of armed demonstrations, refused to grant proportional representation, with the result that the canton was divided into two half-cantons.

Religious troubles were added to these political disputes. In Aargau, where the grand council was composed of Protestants and Catholics in equal numbers, the constitution was altered upon a basis of popular representation by which the Protestants gained numerical advantages. In 1841 two thousand Catholic peasants took up arms, but were beaten by the Protestants at Villmergen; eight convents were suppressed, and much valuable property confiscated. The democrats gained ascendency in Geneva, and in 1842 the same party obtained the upper hand in Valais. In 1844 the grand council of Lucerne entrusted the Jesuits with the direction of public instruction, with the result that the town was attacked by bands of volunteers, who demanded the expulsion of the priests. In defiance of the Federal Pact, Lucerne called to her aid the Forest Cantons, Zug, Freiburg, and Valais, together forming what is known as the *Sonderbund*, whose members declared that they would preserve this 'separate league' till the convents were re-established and the question of the Jesuits abandoned. In 1847 after the deputies of the *Sonderbund* had left the Diet it was resolved to dissolve by force of arms this league of the Catholic cantons. The federal army under General Dufour consisted of 50,000 men, the Catholics brought about half that number into the field, and after a campaign of twenty-five days Freiburg was taken, Lucerne and the smaller cantons capitulated, and the struggle came to an end. No sooner had the *Sonderbund* been dissolved than it became necessary to revive the Federal Pact, and a constitution was adopted for the whole of Switzerland, this being the seventh phase. Owing not only to the development of commerce and industry, but to the difference between the legislature in the cantons, it became necessary in 1874 to revise this constitution, and since then it has been added to and altered.

See, besides works cited at ALPS, ALPINE CLUB, TELL, &c., and others in German or French on the country by Berlepsch, Hottinger, Kaden, Egli, Emminghaus, Wirth, Dierauer, &c., and on the history by Von Müller, Morin, Knonau, Daguet, Vuillemin, Dändliker, Strickler, &c.; Gremli, *The Flora of Switzerland* (Eng. trans. 1889); Victor Tissot, *Unknown Switzerland* (Eng. trans. 1889); Sir F. O. Adams and the present writer, *Swiss Confederation* (1889); W. A. B. Coolidge, *Swiss Travel and Swiss Guidebooks* (1889); B. Moses, *Federal Government of Switzerland* (Oakland, Cal. 1889); Hug and Stead, *Switzerland* ('Story of the Nations' series, 1890); Murray's *Handbook* (18th ed. 1891); Baedeker's *Switzerland* (14th ed. 1891); J. M. Vincent, *State and Federal Government in Switzerland* (1891); B. Winchester, *Swiss Republic* (1891); J. A. and Margaret Symonds, *Life in the Swiss Highlands* (1892); J. Sowerby, *The Forest Cantons* (1892); Victor Fatio, *Faune des Vertébrés de la Suisse* (Gen. 1890); and the *Quellen zur Schweizergeschichte* (12 vols. 1877–91).

Literature.—The literature of Switzerland, save the unimportant part that falls under Romansch (q.v.) or Italian, is included either in German or in French literature; Bodmer and Gessner are as certainly names of mark in German literature as Rousseau or Cherbuliez are in that of France. Here it may therefore suffice to give the names of Swiss writers treated in separate articles, and refer to them: thus to the German division belong Zwingli, Bullinger, Tschudi, Bodmer, Gessner, Zimmermann, Haller, Lavater, Pestalozzi, Johannes von Müller, Fuseli, and Bitzius ('Gotthelf'); to the French Bonivard, Rousseau, Vattel, Bonnet, Benjamin Constant de Rebecque, Bonstetten, Saussure, Sismondi, Necker (and by origin his daughter Mme. de Staël), Dumont, Töpffer, Vinet, and Cherbuliez. Calvin and Beza were Genevese by residence; as were Voltaire and Gibbon for many years. The Swiss-German of the country-people is a High German patois.

See the *Schweizerisches Idiotikon;* and works on the Swiss-German literature by Mörikofer (1861) and Weber (1867); Godet, *Histoire Littéraire de la Suisse Française* (1889); Rossel, *Histoire Littéraire de la Suisse Romande* (1889–91).

Swoon. See FAINTING.

Sword, a weapon of offence consisting of a blade fitted into a hilt or handle, with a guard, the blade being formed to cut or to pierce, generally to do both. The sword is the most highly honoured of all weapons, a symbol of military dignity and authority; and it is the instrument with which the monarch confers knightly honours. Its forms and modifications, and the names under which, in different shapes, it has been known in different lands, and in successive ages, are beyond computation. It is sufficient to say that the general term includes weapons so diverse as the short cutting and piercing daggers and poignards and the ponderous two-handed swords of the 15th century. The blade may thus vary in length from a few inches to four feet and upwards. It may be furnished with a cutting edge on one side only, or on both sides. It may be uniform in breadth throughout with a truncated end, or it may taper from the hilt to a fine point. The blade, moreover, may have a piercing point alone, as in the rapier, and it may be curved throughout its entire length, as in the oriental scimitar. The hilt, with its many forms of guard, grip, and pommel, similarly adds to the variations of the weapon.

The sword, of course, could not be a weapon of primitive man; but it is easy to trace its development from the forms of weapon in use in the stone and early bronze ages. The sword came into use only when men had attained considerable skill in casting and working bronze, and the ancient bronze swords, many of which have been found throughout Europe with two-edged blades measuring two feet in length, are well finished weapons (see Vol. II. p. 477). The early Greek sword (fig 1, *a*) was merely a strong two-edged knife; but about 400 B.C. its form was improved and its size doubled by Iphicrates. The *gladius* of the Romans (fig. 1, *b*) was still of the same form—a straight two-edged blade, heavier and longer, however, than the Greek weapon. During the early middle ages there does not appear to have been much development in the form of the sword in Europe. As shown by the Bayeux Tapestry (q.v.) and other contemporary illustrations, it continued to be a short cutting weapon, with a blade of uniform breadth bluntly pointed, and to give it balance it was channeled from the hilt for about two-thirds of its length. The cross-guard, subsequently called the quillons, was short, projecting at right angles from the blade, but sometimes bent forward in the direction of the point. With the development of armour in warfare it became necessary to give much greater heaviness and strength to the sword; the blade was greatly lengthened and tapered from hilt to point, the guard and the hilt were also

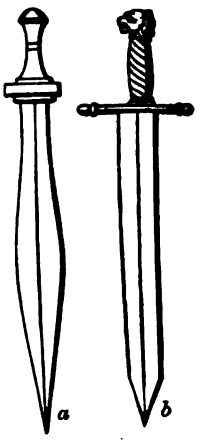

Fig. 1.

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lengthened, and in this way the two-handed sword—the distinguishing arm of the 15th century—was evolved. In Scotland several of these ponderous weapons are preserved, and traditionally associated with the names of Wallace, Bruce, and other contemporary heroes; but such swords were really not in use at so early a period, and so late as 1567 Lindsay proposed to meet Bothwell in single combat at Carberry, armed with 'the famous two-handed sword of Archibald Bell-the-Cat.' With the introduction of the two-handed sword, the use of a shield being no longer possible, the guard gradually became more complicated, so as to give greater protection to the hands of the swordsman, and from the use of shell-guards and ring-guards, &c. the basket-hilt, as applied to lighter swords, by degrees developed. The ordinary basket-hilt sword, such as is worn by officers of Highland regiments at the present day, is of Italian origin, and grew out of the Venetian *schiavone*. The rapier—a piercing weapon only, with a blade tapering to a fine point—came into use in the early part of the 16th century, and in the 17th century it became the weapon of fencing and duelling. From very early times Toledo, Seville, and some other Spanish towns had a high reputation for the excellence of the swords made by their armourers, and when to their own skill was added the perfect craftsmanship of their Moorish conquerors the renown of Spanish blades became supreme. In the North Italian towns also, as well as at Solingen and Passau in Germany, swords of famous quality were fabricated. In Scotland during the 17th and 18th centuries Ferrara blades were held in the highest esteem, and were a very common possession. Who the original maker of these famous blades was is not known, but in the 16th century there was a family of armourers named Ferrara (q.v.) in North Italy, one member of which, called Andrea, was born in 1555. It is, however, obvious from the long period over which the manufacture extended that 'Ferrara' became more a trade-mark than a maker's name. Many magnificently finished examples of swords from the Renaissance period downwards are preserved as art treasures in public and private collections. On the enrichment of these the highest efforts of artificers and artists have been expended, and they have been lavishly adorned with gold enamels and precious stones. Additional interest is given to some of these swords by the legends attaching to them, and by the historical importance of the personages to whom they belonged. Mythical stories are also numerous of craftsmen endowed with marvellous powers, and with whose blades unheard-of feats could be performed. In modern warfare the sword possesses little more than an honorary military significance.

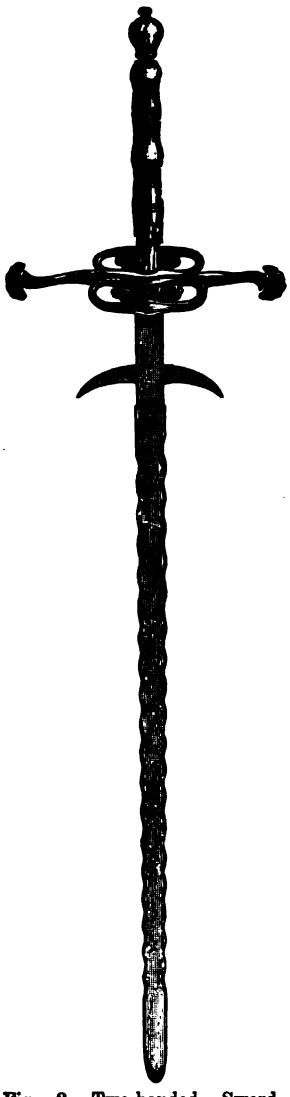


Fig. 2.—Two-handed Sword, preserved in Duff House.

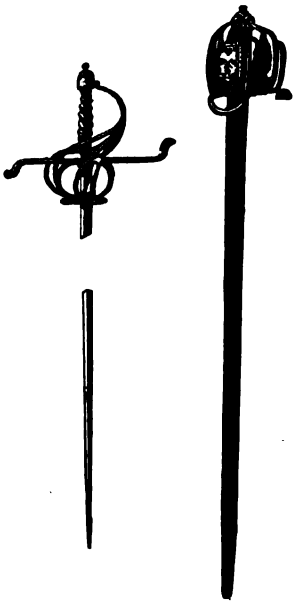
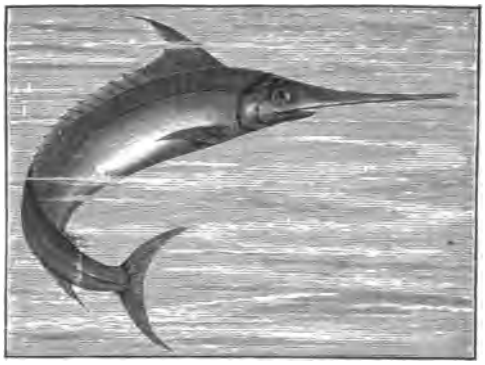


Fig. 3.—*a*, Rapier, 16th century; *b*, Basket-hilted Ferrara.

See DAMASCENING, and, besides works cited at FENCING and DUELLING, James Drummond's *Ancient Scottish Weapons* (1881), Sir R. Burton's *Book of the Sword* (vol. i. 1884), Sir F. Pollock's *Oxford Lectures and other Discourses* (1891), Captain A. Hutton's *The Swordsman* (1891), and Vigeant's *Ma Collection d'Escrime* (1892).

Sword-fish (*Xiphiidæ*), a family of spiny-rayed Teleostean fishes, abundantly represented in tropical and subtropical seas. They are among the largest bony fishes, sometimes measuring 12 to 15 feet in length. The sword, which may be over 3 feet long, is formed from a compressed prolongation of the upper jaw, and is often strong enough to stab whales fatally, or less advantageously to pierce the bottom of a ship or the planks of a boat. The genus Xiphias is well represented by the common sword-fish (*Xiphias gladius*), abundant in the Mediterranean and in the warmer parts of the Atlantic and Pacific, and of rare occurrence on British coasts. They are found in schools, but never in close company; they feed on such fishes as mackerel, menhaden.



Common Sword-fish (*Xiphias gladius*).

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and herring, which they kill with the sword, and also it seems on cuttle-fish. The flesh is somewhat oily, but is highly esteemed, both fresh and salted. With the regular sword-fish fishermen, harpooning is the mode of capture. The genus Histiophorus, the members of which are also called sail-fishes or bill-fishes, has a greatly developed dorsal fin or sail, and has long, compressed ventral fins which are absent in Xiphias. As in the true sword-fish, the young, with undeveloped swords, are very different from the adults. In summer Histiophorus occurs in the American seas as far north as New England, but it is strictly a tropical fish. Another form—the spear-fish—of similar distribution, is generally referred to a distinct genus, Tetrapturus. The bony sword-fishes must not be confused with the cartilaginous Sawfishes (q.v.) belonging to the Elasmobranch genera Pristis and Pristiophorus.

Sybaris, an ancient city of Magna Græcia, stood on the Gulf of Tarentum, and was founded about 720 B.C. by colonists from Achæa and Trœzene. The fertility of its soil and its liberal policy favoured commerce, and the city flourished and became very prosperous. Its citizens led such luxurious and self-indulgent lives that their name became a by-word amongst the peoples of antiquity. Quarrels between the democratic and oligarchic factions led in 510 B.C. to a war with the neighbouring colony of Crotona (q.v.), in which the forces of the Sybarites were totally routed, their city captured, and the site where it stood obliterated by the victors, who turned upon its ruins the waters of the adjacent river Crathis. See THURII.

Sybel, HEINRICH VON, German historian, was born at Düsseldorf on 2d December 1817. Perhaps the most eminent of Ranke's pupils, he became successively professor of History at Bonn (1841), Marburg (1846), Munich (1856), and Bonn again (1861), in Munich also filling the post of secretary to the Historical Commission of the Royal Academy of Sciences. At various times between 1848 and 1880 he sat in the parliaments of Hesse, the North German Confederation, and Prussia, as a National Liberal and an opponent of the Ultramontanes. In 1875 the Prussian government made him director of the state archives at Berlin; and as such he was instrumental in publishing the Political Correspondence of Frederick the Great, and in organising at Rome a 'Prussian station for Researches in German History,' besides assisting in the publication of the *Monumenta Germaniæ Historica*. Moreover he founded and edited the *Historische Zeitschrift*. Sybel's first book was a history of the First Crusade (1841), in which, applying the critical methods of his master, he destroyed the accepted opinions of centuries; his next the *Entstehung des deutschen Königthums* (1844). Then, after an interval of nine years, came his first masterpiece, *Geschichte der Revolutionszeit von 1789 bis 1795* (3 vols. 1853–58; 4th and greatly improved ed. 1877), a cool, sober, and dignified statement of the historic causes and consequences of that eventful period, based upon a critical examination of official documentary evidence. A second part or continuation, bringing the narrative down to 1800, was published in 2 vols. in 1872–74. His second great work is entitled *Die Begründung des deutschen Reichs durch Wilhelm I.* (5 vols. 1889–90; English trans., New York, 1891), exhibiting the same qualities as the book on the revolutionary era. Von Sybel has also published three volumes of *Kleine Historische Schriften* (1863-81).

Sycamine, a tree mentioned in Scripture, and supposed to be the Black Mulberry (q.v.).

Sycamore (*Sycomŏrus*), a genus of trees of the natural order Moraceæ, regarded by many botanists as a mere sub-genus of Ficus (see FIG), and differing from the true figs only in the elongated, straight, thickened, and club-shaped stigma. The species are chiefly African, but the geographical range extends also into the west of Asia. Some of them attain a large size and a great age. The Egyptian Sycamore (*Ficus Sycomorus*), supposed to be the sycamore of the Bible, is a large tree, abundant in Egypt and in Syria and

Branch of *Ficus Sycomŏrus*: *a*, fruit.

other parts of the west of Asia, often planted near villages for the sake of its shade, its wide-spreading head sometimes covering a space 40 yards in diameter. The figs are top-shaped, and grow in clustered racemes on the trunk and oldest branches. They are sweet, well flavoured, and somewhat aromatic. The wood is light, porous, and of little value. Other species are found in Abyssinia, South Africa, &c.

The sycamore-tree of England is a species of Maple (q.v.), and in Scotland is usually called plane-tree (though neither plane nor sycamore). In some parts of North America the name of sycamore is given to the Plane (q.v.) of that country, *Platanus occidentalis*.

Sycosis, a pustular eruption on the scalp or bearded part of the face, due to Ringworm (q.v.), Acne (q.v.), or Impetigo (q.v.).

Sydenham, a district in Lewisham parish, Kent, 8 miles S. of London. It has become of world-wide celebrity in connection with the Crystal Palace, which, however, is really in the adjoining parish of Lambeth, Surrey, and which was erected in 1852–54, chiefly from the materials of the building of the Great Exhibition (1851), and under the superintendence of Sir Joseph Paxton. The cost of the erection and appointment of the Crystal Palace amounted to nearly £1,500,000. The building is 1608 feet long, 390 wide across the transept, and 175 feet high, the height of the two water-towers being 282 feet. The chief arts and sciences illustrated by the collections within the Palace and grounds are Sculpture, Architecture, Painting and Photography, Mechanics and Manufactures, Botany, Ethnology, Palæontology, Geology, and Hydraulics. There are two concert-rooms, within the larger of which on occasion of the triennial Handel festivals (since 1859) performances have taken place with 4000 vocalists and instrumentalists. The park and gardens occupy nearly 200 acres, and are adorned with sculptures, stone balustrades, &c., and fountains which are perhaps the finest in the world. On 30th December 1866 there was a fire in the north wing, doing damage to the amount of £150,000; and the Crystal Palace has never been a monetary success. It is still carried on; but in 1887 the company was declared insolvent, the total expenditure then having been £3,004,737, the receipts £4,409,969, and the number of visitors over 50,000,000.

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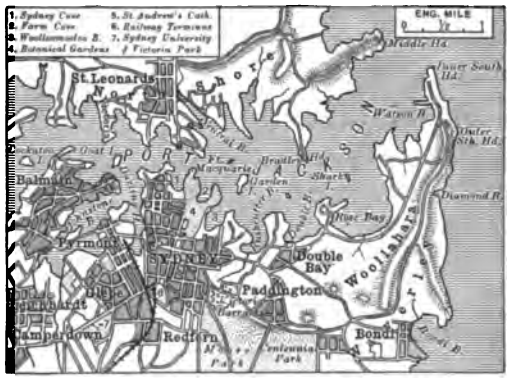
Sydenham, FLOYER (1710–87), an amiable and accomplished man of letters, whose privations and miserable end brought about the foundation of the Literary Fund, graduated at Wadham College, Oxford (M.A., 1734), and in his fiftieth year began the publication, by subscription, of a complete English version of Plato's *Dialogues*, each to be prefaced by a critical introduction and illustrated with explanatory notes. The *Io* appeared first, and was followed by the *Hippias Major* and *Minor* and the *Banquet*. Superior in style and scholarship to the general run of 18th-century translations, its merits found scant appreciation from a world not yet ripe for Plato's philosophy; subscribers were few, and the public were not tempted by the low price of the book to purchase or interest themselves in it. Undaunted by this failure, Sydenham made another attempt at arousing a taste for Greek philosophy by his dissertation on Heraclitus (1775). This too, had no market, any more than his publication entitled *Onomasticon Theologicum* (1784). Three years afterwards he was arrested at the suit of a victualler for unpaid meals, and died in prison.

Sydenham, THOMAS, the 'sommo Ippocratista inglese' (supreme English Hippocratist), as Puccinotti styles him, was born in 1624 at Winford Eagle in Dorsetshire, and died in London, 29th December 1689. That he belonged to one of the county families; that at eighteen he was entered at Magdalen Hall, Oxford; that his studies were, after two years, interrupted by his having to serve as an officer in the parliamentarian army; that his Oxford curriculum ended in 1648 when he graduated M.B., and shortly after became a Fellow of All Souls—is the sum of our knowledge as to his youth and early manhood. For the next fifteen years we lose sight of him, though he probably spent some of them at Oxford, if not also at Montpellier. We find him in London in 1663 as a licentiate of the College of Physicians, publishing his *Methodus Curandi Febres* in 1666; and ten years thereafter taking his M.D. at Pembroke Hall, Cambridge. With the College of Physicians, or even with Oxford, he seems to have had no subsequent connection; and all through his life he was not a *persona grata* with the faculty. The 'Iatro-physical' and 'Chemiatric' theories in fashion at the time he treated with scant consideration, and looked upon chemistry itself as a mere branch of the apothecary's business. But from his intimacy with John Locke and Robert Boyle we might infer his appreciation of the true philosopher and the true physicist, even if we did not know his profound mastery of the Hippocratic method and his perfect assimilation of the Hippocratic spirit. In 1668 he published a second edition of his book on fevers, adding to it a chapter on plague, with a fine poem in Latin elegiacs addressed to him by Locke. A third and enlarged edition, entitled *Observationes Medicæ*, appeared in 1676. In 1680 he published two *Epistolæ Responsoriæ*, the one 'On Epidemics,' and the other on the 'Lues Venerea.' His *Dissertatio Epistolaris* on confluent smallpox and hysteria (1682) was followed next year by his yet more famous *Tractatus de Podagra et Hydrope*. In 1686 appeared his *Schedula Monitoria de Novæ Febris Ingressu*, and in 1692 his last work, *Processus Integri*, an outline of pathology and therapeutics. An acute attack of gout carried him off in his sixty-sixth year, and he was interred in St James's Church, Piccadilly, where in 1810 the College of Physicians erected a mural tablet to his memory.

Sydenham's place in the history of medicine has already been given. Seemingly behind his age in science, he was really ahead of it in practice. The new-born anatomy and physiology had with premature confidence lent itself to theories, mathematical and chemical, which were utterly at variance with the phenomena of disease as noted at the bedside. He soon satisfied himself that it was hopeless to reconcile them, and that meanwhile, with practical English sense, it was his business to get his patients well. In acute disease he read the forth-putting of that activity by which nature sought to right herself—an activity to be watched and, when possible, to be assisted. Called in to a patient who had been deplorably reduced by lowering treatment, he reversed the practice and 'ordered a roast chicken and a pint of canary.' Chronic diseases he also viewed with the eye of Hippocrates, as due to habits or errors for which we ourselves are mainly responsible, and these he met by appropriate changes in diet and mode of life. The Hippocratic 'natural history method' of looking at and treating ailments of all kinds it was his great merit to have intelligently revived. Among special contributions to nosology he may be said to have first diagnosed scarlatina and classified chorea, while Puccinotti claims for him the title of 'restorer of the curative treatment of smallpox.' Gout was another ailment on which he left a memorable mark. It was as a practitioner, however, that his powers worked most freely and most felicitously.

See Puccinotti's *Storia della Medicina*, vol. iii.; Häser's *Geschichte der Medicin*; Dr W. A. Greenhill's admirably edited *Opera Omnia* of Sydenham, with Dr R. G. Latham's English rendering of the same (both published by the Sydenham Society, which was founded in 1843); Dr John Brown's *Locke and Sydenham*; and Picard, *Sydenham, sa Vie, ses Œuvres* (Paris, 1889).

Sydney, the capital of New South Wales, and the oldest city in Australia, is situated on the southern shores of Port Jackson, and was named after Thomas Townshend, first Viscount Sydney (1733–1800), who was then Secretary of State for the Colonies. The first party of British settlers that reached New Holland were landed at Botany Bay (q.v.) on January 20, 1788. The spot which they here selected being found ineligible, it was abandoned a few days afterwards, and the infant settlement was transferred to a point about 7 miles farther to the north, the place where Sydney



now stands. The choice of the new locality was chiefly determined by the circumstance of a stream of fresh water being found there, flowing into the deep inlet known as Sydney Cove, one of the numberless bays into which the basin of Port Jackson is divided. This last-mentioned magnificent expanse of water, completely landlocked, and admitting vessels of the largest size, extends for some 20 miles inland, ramifying in every direction. Its bold and rocky shores, covered with luxuriant vegetation, present a succession of picturesque and beautiful landscapes. The hills which

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form the general outline of the harbour often rise to a height of from 200 to 250 feet. In other points the coast presents a lower level, consisting of a series of terraces and smooth sandy beaches. Perhaps there are few positions on the habitable globe more obviously suitable for the foundation of a great metropolis than are the shores of Sydney Harbour. The narrow entrance of Port Jackson—through the 'Heads,' which are indicated by the Macquarie lighthouse, its electric light visible 30 miles at sea—might easily be made inaccessible to any hostile fleet; whilst the central position of Sydney makes it necessarily an emporium for many of the British dependencies in the southern hemisphere. The immense coal formation of East Australia extends north and south for some 500 miles, with a breadth of from 80 to 100 miles. Sydney stands nearly in the centre of this great carboniferous basin; and at various points within a radius of from 30 to 100 miles large quantities of coal are raised for colonial consumption as well as for export. The sandstone rock upon which the city is erected affords a valuable material for building.

Since the abolition of transportation the growth of Sydney has been rapid, the pop. in 1862 amounting to 93,596, in 1881 to 220,427, and in 1891 to 386,400. For many years Sydney enjoyed a monopoly of the commerce of these antipodean regions, but its trade has now become largely shared by Melbourne, Adelaide, Brisbane, and other colonial ports. It must, however, continue the principal outlet for the productions and commerce of extensive pastoral and mineral districts on the north-west, west, and south-west. The city, which has rapidly increased of late years, extends several miles inland from the waters of Port Jackson, the whole of the water frontages from Fort Macquarie, 8 miles from the 'Heads,' to the head of Darling Harbour, a distance of several miles, being occupied for wharfage purposes, those at Circular Quay being used by the vessels of the P. and O., Orient, and other large ocean steamship companies. In 1890, 5666 vessels, with an aggregate tonnage of 4,235,809 tons, entered or left the port of Sydney.

The streets in the older parts of the town are narrow and irregular: in the newer portions care has been taken to avoid these defects; and several of the modern streets, from their breadth and the size and style of the buildings, are not behind those of the principal towns of Europe. The shops, warehouses, and private buildings in the leading streets present long and compact lines of well-built stone edifices, often assuming a very ornate and ambitious style of architecture. The chief thoroughfares are paved, and lighted with gas, several with the electric light, and a system of underground drainage has been carried out at a cost of nearly half a million sterling. There is also an abundant supply of pure water, considerably in excess of present requirements, obtained from the Nepean River, near Penrith, several miles from Sydney. There are numerous parks near the city. The Botanical Gardens, the finest in the colonies, cover 38 acres. Sydney has one shipbuilding establishment. The Fitzroy Dry Dock, originally intended for vessels of the Royal Navy, can take in vessels of the largest size, and has been supplemented by one of the most extensive graving-docks in existence. Steps have been taken to put the city in a state of defence, and forts and batteries armed with powerful Armstrong guns have been erected. The climate of Sydney is upon the whole temperate and healthy, cloudless sunshine prevailing during the greater part of the year.

Amongst public buildings by far the most important edifice, not only in Sydney but in the whole of the Australian colonies, is the university (1852), which stands on a commanding height, and in the centre of a domain of about 150 acres. The principal façade is 500 feet in length, and is flanked at its western end by the Great Hall, the proportions of which are such that, were it in England, it would rank as the third in point of size. There are two affiliated colleges—that of St Paul's, belonging to the Church of England, and St John's (Roman Catholic). The university, erected out of public funds, has a permanent endowment of £5000 a year from the state; and each of the affiliated colleges receives aid towards the stipends of the warden and rector. Recently the university funds have become considerably augmented by munificent bequests, which have enabled the work of university education to become considerably extended. It is open to both sexes, and is empowered to confer degrees in arts, law, and medicine; but, so far as the university is concerned, instruction is limited to purely secular teaching. The metropolitan cathedral of St Andrew is a handsome building in the later Perpendicular style of architecture. The Roman Catholic cathedral of St Mary, burnt in 1865, and since rebuilt, is one of the finest ecclesiastical structures in Australia. Many of the city and suburban churches, upwards of 120 in number, are tastefully designed. There are numerous elementary, advanced, and technical schools, and a technical university and technological museum. Amongst the buildings devoted to secular purposes the most imposing and effective, in point of size and architectural design, are the museum, Colonial Secretary's office, lands office, post-office, customs office, town-hall (possessing the largest organ in the world), and public grammar-school. The neighbourhood of Sydney, especially the shores of the numerous bays and the Parramatta and Cane Cove rivers, is studded with elegant villas and snug cottages, surrounded by their park-like grounds, and gardens of orange-trees, bananas, and numberless semi-tropical plants. There are numerous industrial establishments, several on a most extensive scale, but Sydney is essentially a commercial rather than a manufacturing city. Sydney has several theatres, a free library, art-gallery, museum, hospitals, mechanics' institutes, orphan and other asylums, and various charitable and benevolent institutions, and is connected with the provinces and adjoining colonies by an extensive railway system.

Sydney, a small town of Cape Breton (q.v.), with a large coalfield.

Sydney, ALGERNON. See SIDNEY.

Syene. See ASSOUAN.

Syenite, a rock composed essentially of orthoclase and hornblende. It is granitoid and wholly crystalline—i.e. it contains no non-differentiated mineral matter. Quartz is sometimes sparingly present, and other accessory minerals may occur, such as oligoclase, sphene, zircon, apatite, ilmenite, &c. *Elæolite-syenite* is characterised by the presence of elæolite—an altered variety of nepheline. Syenite is an igneous rock of deep-seated origin, occurring in the form of bosses and veins. It is not known in the British Islands, but is met with in various countries in Europe and in America.

Sylhet, or SILHET (*Srihatta*), a British district in the extreme south of Assam (q.v.), partly a rich alluvial tract, but to the extent of 32 per cent. uncultivable waste, has an area of 5413 sq. m. and a pop. of 2,000,000. The chief town, Sylhet, on the Surmá River, has a pop. of 15,000, and some trade and manufactures.

Sylla. See SULLA.

Syllabub, a culinary preparation, formerly much used, consisted of sugar and cream, flavoured

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with brandy, sherry, and lemon rind and juice, worked into a froth, and served in glasses. White of egg and verjuice seem also at times to have been ingredients.

Syllabus, a term from the Greek usually applied to a compendium or abstract of a lecture or series of lectures, is specially used of the papal syllabus which accompanied the Encyclical (q.v.) *Quanta Cura*, addressed by Pius IX. to all Catholic bishops on 8th December 1864. This syllabus is a catalogue of eighty errors or heresies, and implicitly enjoins the opposite truths; and by Protestants has generally been regarded as a declaration of war against all freedom of thought, modern civilisation, and social progress, and a reassertion of the extravagant claims of the mediæval papacy to supreme authority on every subject. The syllabus is divided into ten sections, condemning (1) pantheism, naturalism, thorough-going rationalism; (2) milder rationalism; (3) latitudinarianism; (4) socialism, communism, secret societies, &c.; (5) errors as to the rights of the church; (6) as to the constitution of society; (7) as to ethics; (8) as to marriage; (9) as to the temporal power of the pope; (10) the errors of modern liberalism. The infallibility of the pope is indirectly asserted, as is the right of the Roman Catholic Church to exercise complete control over education, literature, and science. Catholics have debated amongst themselves whether the syllabus is an *ex cathedrâ* papal utterance, and so to be regarded as *de fide* and infallible, in terms of the Vatican decree.

See Mr Gladstone's *Vatican Decrees in their bearing on Civil Allegiance* (1875); Cardinal Manning's reply with the same date and title, and the *Letter to the Duke of Norfolk*; and, again, Mr Gladstone's answer in *Vaticanism* (1875). The text of the syllabus will be found in Schaff's *Creeds of Christendom*, vol. ii.

Syllogism. See LOGIC.

Sylphs, in the fantastic system of the Paracelsists, are the elemental spirits of the air, just as the salamanders are of fire and the gnomes of earth. They hold an intermediate place between immaterial and material beings. They eat, drink, speak, move about, beget children, and are subject to infirmities like men; but, on the other hand, they resemble spirits in being more nimble and swift in their motions, while their bodies are more diaphanous than those of the human race. They also surpass the latter in their knowledge, both of the present and the future, but have no soul, and when they die nothing is left. In form they are ruder, taller, and stronger than men, but stand nearest to them of all the elemental spirits, in consequence of which they occasionally hold intercourse with human creatures, being especially fond of children and of simple harmless people; they even marry with our race, like the Undines and the Gnomes, and the children of such a union have souls and belong to the human race. In common usage the term sylph is applied to a graceful maiden—a change of meaning probably owing to the popularity of Pope's *Rape of the Lock*, which introduced the term into the world of fashion and literature. For although even in Pope the sylph that guards Belinda is masculine, yet the poet so refined and etherialised his spiritual agents that they soon came to be identical with ideas of feminine grace and beauty.

Sylt, a narrow island, 23 miles long, off the west coast of Sleswick, with a population of 3000, many Frisians. The chief town is Keitum.

Sylvester, name of three popes.—Sylvester I. (314–335) is claimed to have baptised Constantine the Great, and to have received from him the famous Donation. He was canonised, his day falling on December 31.—Sylvester II., whose name was Gerbert, was born at Aurillac in Auvergne about 950, and early acquired from his extraordinary attainments in philosophy, but especially in mathematics and chemistry, the reputation of being in league with the Devil. Made abbot of Bobbio by Otto II., he opposed the papal claims at the Synod of Rheims (991), but afterwards became reconciled with the pope, and was made Archbishop of Ravenna (998), from which he climbed into the papal chair in 999, which he filled till his death in 1003. His *Letters* were edited by Olleris (Clermont, 1867). See the works thereon by J. Havet (1889) and Boubnov (1889), and the studies by Werner (1878), Nagl (1888), and Weissenborn (1888).—Sylvester III. (1044–46), Antipope to Benedict IX., set aside at the Synod at Sutri.

Sylvester, JAMES JOSEPH, mathematician, was born in London, 3d September 1814, studied at St John's College, Cambridge, and was successively professor in University College, London, in the University of Virginia, at Woolwich, in the John Hopkins University, and at Oxford (Savilian professor, 1883). He has published many memoirs in the scientific journals, has received many medals and honours, is LL.D., D.C.L., F.R.S., and fellow of many foreign academies. See the notice by Cayley in *Nature*, vol. xxxix.

Sylvester, JOSHUA, was born in 1563. His life was divided betwixt merchandise and poetry, but in neither did he achieve success. Of his original works the human memory retains no trace, save perhaps only in the title of the poem published about 1620, entitled *Tobacco Battered and the Pipes Shattered by a Volley of Holy Shot thundered from Mount Helicon*; but in virtue of the great though short-lived popularity obtained by his English version of the *Divine Weeks and Works* of Du Bartas he lives in literary history a kind of shadowy life. He led a somewhat wandering existence, and died at Middelburg in Holland in 1618. His Works (1641) were reprinted by Grosart in the 'Chertsey Worthies Library' (1878).

Sylviadæ. See WARBLER.

Sylviculture. See ARBORICULTURE.

Symbiosis (Gr., 'living together'), a biological term introduced by De Bary to denote certain kinds of physiological partnership between organisms of different kinds. Consortism is synonymous. As there are many kinds of organic association, it is convenient to restrict the term symbiosis to such intimate and complementary partnerships as exist between algoid and fungoid elements in lichens, or between unicellular Algæ and Radiolarians. In organic nature there is no isolation; no organism lives or dies to itself; there are countless vital associations, some very indirect and external—e.g. the mutual dependence of some flowers and insects—others very direct and intimate, as in the symbiosis of Algæ and Radiolarians. It often happens that two organisms live together without there being any apparent vital bonds between them; thus, Diatoms may be 'epiphytic' on Algæ; Algæ, lichens, mosses, ferns, orchids, &c. are often epiphytic on trees; many Algæ are 'epizoic' on animals—e.g. those which live among the hairs of sloths; and one animal may be epizoic on another, as sponges often are on zoophytes. Again, there may be external partnerships, such as those between pilot-fish and shark, or between beef-eater birds and wild cattle. These suggest cases of mutualism or Commensalism (q.v.), such as the partnership between certain hermit-crabs and sea-anemones. Probably the constant occurrence of colonies of the Alga Anabæna in the leaves of the aquatic plant Azolla is a similar

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partnership. Alike in symbiosis and in commensalism the partnerships are advantageous to both of the associated organisms, and are therefore to be distinguished from Parasitism (q.v.), in which the benefit is all on one side. It is useful to distinguish these different grades of association, but it cannot be pretended that the distinctions are rigid.

Apart from lichens, the partnership of unicellular Algæ with Radiolarians is the best-known case of symbiosis. The partner Algæ—known for a long time as 'yellow cells'—used to be variously interpreted as reproductive cells, secretory cells, reserve stores, parasites, and so on; but the researches of Geddes, Brandt, and others demonstrated their algoid and truly symbiotic nature. They have a cellulose wall (except in the Acanthometridæ among Radiolarians), a nucleus, two pigments, of which one is at least closely analogous to the ordinary chlorophyll of plants; they are able to live and multiply after removal from their host or after its death; in sunlight they evolve oxygen and form starch; they multiply as do free unicellular Algæ. From his experiments Geddes inferred that the starch formed by the Algæ may be absorbed by the Radiolarians; that when they die the Algæ are digested by their partners; that during life they absorb carbonic acid and nitrogenous waste from the Radiolarians and in turn liberate oxygen which may accelerate the vital functions of their bearers. It seems that the partnership is distinctly advantageous, for the Algæ flourish and multiply, and those Radiolarians which are without Algæ are few and much less common than the vast majority which exhibit symbiosis. Brandt's results are for the most part in agreement with those of Geddes, though divergent on some points of details. The Algæ may belong to a distinct genus (Zooxanthella of Brandt, Philozoon of Geddes), or may be simply the swarm-spores of various olive-green seaweeds.

Similar symbiotic Algæ occur in some Foraminifers, in several Cœlenterates, especially otherwise colourless sea-anemones, and, according to Geddes, in some species of the Turbellarian Convoluta. Brandt maintains that in the fresh-water sponge (Spongilla) and in the fresh-water Hydra there are symbiotic Algæ of the genus Zoochlorella, but Ray Lankester has shown to the satisfaction of most naturalists that the pigmented bodies in those animals are no more symbiotic Algæ than are the green corpuscles in the leaf of a buttercup. Many marine sponges are infested by various kinds of Algæ, but we do not know that they exhibit any real symbiosis.

In regard to some green Protozoa there is much dispute whether the green colour is due to chlorophyll bodies or to symbiotic Algæ. Some forms—e.g. *Stentor polymorphus*, *Coleps viridis*, *Ophrydium viride*, and *Vorticella chlorostigma*—also occur in a colourless state. Geza Entz regards the bodies as Algæ, Miss Salitt as chlorophyll corpuscles. Famintzin finds 'Zoochlorellæ' in species of Paramœcium, Stentor, and Stylonichia, which he regards as symbiotic forms of the Protococcus-like Chlorella which he and Beyerinck have discovered living freely. Thus it appears that, while many cases of symbiosis are indubitable, there are other cases in regard to which judgment must be for a time suspended.

See COMMENSALISM, EPIPHYTES, LICHENS, PARASITIC ANIMALS; O. Hertwig, *Die Symbiose* (Jena, 1883); Geddes, *Nature*, xxv. (1882); Brandt, *Archiv. f. Anat. u. Physiol.* (1882), and *Mittheilungen Zool. Stat. Neapel*, iv. (1883); Ray Lankester, *Nature*, xxvii. (1882).

Symbol (Gr. *symbolon*, 'a sign') is sometimes used of arbitrary or other conventional marks (as of letters of the alphabet, numbers, &c.) which greatly abbreviate methods of scientific expression, as in algebra and mathematics, and especially in chemistry (for chemical symbols, see CHEMISTRY, ATOMIC THEORY). Alchemy and Astrology (q.v.) raised a large crop of symbols; from the latter astronomy has derived not a few. But symbol is now usually almost synonymous with emblem—a concrete and visible figure standing for something moral, intellectual, or religious. A lion is the symbol of courage, a lamb of meekness, &c. Greek and Roman mythology produced a large number of symbols—the trident of Neptune, the peacock of Juno, &c. Early Christian symbolism—originating mainly in a Greek colony in Rome—may be traced in the Catacombs, and an outline of its development has been already sketched in the article CATACOMBS. The greatest number of symbols are those which represent Christ—some mere letters or combinations of letters, as the Monogram (q.v.), composed of A and Ω, of IX and ☧ (for *Christos*; see CROSS), of IHΣ (initials of *Iesous*). Of another kind is the word IXΘΤΣ, the Greek work for fish, the several letters standing for the initial letters of the Greek words Ἰησοῦς Χριστὸς Θεοῦ Τἱὸς Σωτῆρ. The symbol of a pictured fish is also used for Christ; and some contend that this symbol, for whatever reason, was in use before the acrostic word was invented or thought of. Then there are pictures of the Good Shepherd, the True Vine, &c. (see also SAINT). So innumerable devices symbolised facts of Christian history, or aspects of Christian truth. In her ritual the Roman Catholic Church has given copious expression to religious symbolism. In architecture also symbolism appears in the cruciform shape of churches, in Orientation (q.v.), &c. In theological language it should also be noted that symbol sometimes means, like the Greek *symbolon*, a creed; hence symbolics is the study of the history and contents of Christian creeds.

On symbolism in art, see Mrs Jameson's *Sacred and Legendary Art*, the last volume, by Husenbeth, of Baring-Gould's *Lives of the Saints* (1872-92), Munter's *Sinnbilder* (1825), Auber's *Symbolisme Religieux* (1850), Tyrrwhitt's *Art Teaching of the Primitive Church* (1873), Miss Twining's *Symbols and Emblems* (1885), Clement's *Christian Symbols* (Boston, 1886), Miss Stokes's translation of Didron's *Christian Iconography* (1886), Allen's *Early Christian Symbolism in Great Britain and Ireland* (1887), Hulme's *Symbolism in Christian Art* (1891).

Syme, JAMES, surgeon, was born, the son of a Fife lawyer, in Edinburgh, 7th November 1799, and received a thorough education in arts and medicine in the university of that city. Liston appointed him anatomical demonstrator. In 1818 he announced in *Annals of Philosophy* a method of making waterproof cloth by means of caoutchouc dissolved in coal-tar naphtha—a process for which a patent was taken out by Mackintosh of Glasgow. From 1823 to 1832 he lectured on surgery, and, when refused a surgical appointment in the Edinburgh Infirmary, he established Minto House Hospital at his own expense, where he delivered a clinical course from 1829 to 1833. In 1831 appeared his well-known treatise on *The Excision of Diseased Joints*; and in 1832 his *Principles of Surgery*, which went through many editions, and which established his reputation as a teacher of the first rank. In 1833 he was elected to the chair of Clinical Surgery in the university, and in 1838 he was appointed surgeon in ordinary to the Queen in Scotland. In 1848 he gave up his Edinburgh chair to fill that vacated in London by the death of Liston; but collegiate misunderstandings induced him, after five months, to return to Edinburgh, where he was reappointed to his old chair. His life abounded in controversies. As an operator Syme had no superior; as a teacher he had no equal.

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His innovations in the practice of his art were characterised by so much ingenuity, controlled by such scientific caution, that they were everywhere adopted. One of the best known of his pupils, Dr John Brown, terms him (*Horæ Subsecivæ*, i.) the 'best and ablest and most beneficent of men,' and the greatest surgeon Scotland ever produced. He further calls his spoken or written style 'the perfection of terse clearness.' Syme was a contributor to the *Monthly Medical Journal*, and was also the author of treatises on *Diseases of the Rectum*, on the *Pathology and Practice of Surgery* (1848), on *Stricture of the Urethra and Fistula in Perineo* (1849), on *Incised Wounds*, &c. He died June 26, 1870. See the *Memoir* by Dr Paterson (1874).

Symington, WILLIAM (1764–1831), one of the inventors of steam-navigation. See SHIPBUILDING, Vol. IX. p. 402.

Symmachus, QUINTUS AURELIUS, a distinguished Roman orator, who flourished from 340 till 402 A.D., was educated in Gaul, and became prefect of Rome in 384 under Theodosius the Great, consul in 391. He was sincerely devoted to the old religion, but his purity and nobility of character were worthy of the highest Christian type. His extant writings consist of ten books of Letters, three panegyrics on Valentinian I. and Gratian, and fragments of six senatorial orations. The fragments of the orations were first discovered by Cardinal Mai in a palimpsest, part of which is at Milan, part at the Vatican, and were successively published in 1815 and 1825. Many corrections were made in the collation made by O. Seeck, which were followed in the edition included in the *Monumenta Germaniæ Historica* (vol. vi. Berlin, 1883). See Morin's *Étude* (Paris, 1847).

Symonds, JOHN ADDINGTON, English man of letters, was born at Bristol on 5th October 1840, was educated at Harrow and Balliol College, Oxford, won the Newdigate prize, and was elected a Fellow of Magdalen College in 1862. His first book, *Introduction to the Study of Dante* (1872), was a sort of commentary on the great Italian's poem; it was followed by a laudable endeavour to present in readable English the results of the investigations of scholars in Greek learning—*Studies of the Greek Poets* (2 vols. 1873–76). But his most notable achievement is *The Renaissance in Italy*, a history of an eventful period written in a highly polished style, with fairly good judgment, and an extensive knowledge of the actors and events of the epoch described. It embraces four parts and a couple of supplementary volumes—*The Age of the Despots* (1875), *The Revival of Learning* (1877), *The Fine Arts* (1877), *Italian Literature* (2 vols. 1881), and *The Catholic Reaction* (2 vols. 1886). *Shakespeare's Predecessors in the English Drama*, published in 1884, contains the results of thoughtful study in English literature. Symonds has written, besides the books named, two or three volumes of travel sketches in Italy and elsewhere; the monographs *Shelley* and *Sir Philip Sidney* for the English Men of Letters series and *Ben Jonson* for the English Worthies series; a translation of the *Sonnets of Michaelangelo and Campanella* (1878), one of Benvenuto Cellini's autobiography, and an interesting collection of students' Latin songs of the 12th century under the title of *Wine, Women, and Song; Mediæval Songs in English Verse* (1884); *Life of Michaelangelo* (2 vols. 1892); some volumes of verse; and an account of his residence at Davos in the Swiss Alps (1892), where, owing to the state of his health, he has lived for several years.

Sympathetic Ink. See INK; for the Sympathetic Powder, see DIGBY; for the Sympathetic System, see NERVOUS SYSTEM.

Symphony, in Music, a form of orchestral composition. The name was originally applied to the purely instrumental portions of works primarily vocal, under it being included overtures to operas and oratorios as well as ritornelli and the introductions to choruses and arias. It received its first restrictive meaning towards the end of the 17th century when, under Lulli and Alessandro Scarlatti, the various instrumental pieces in the operas began to grow in importance: it was then reserved for the opening section or overture, which consisted of a series of contrasted movements without definite rule as to their number or arrangement. Subsequently a plan, attributed to Lulli and known as the 'ouverture à la manière française,' prescribed three movements, the first and third slow and the middle one quick and bright. Its place was eventually taken by the 'Italian overture,' in which the three movements were retained but in inverse order, the first and last being quick and the second slow. This form was identical with that of the clavier-sonata, to which, however, the overture long remained inferior in respect of the internal structure of its movements, few composers caring to show themselves at their best in pieces to which talkative audiences paid little heed. As a further result of such inattention it seemed to be forgotten that the overture should fitly foreshadow the work which it preceded: its material, consequently, became distinct and independent, so that it was only natural that the best examples should in course of time find their way into the concert-room, where they met with a more courteous reception. A new outlet being thus provided, original works were soon forthcoming; and with the liberation of the symphony from its operatic surroundings its development as an abstract form of art may be said to have begun. Meanwhile the reinforcement of the ordinary stringed orchestra by certain wind-instruments introduced fresh possibilities of expression which reacted on the material of which the movements were composed. In some of Stamitz' symphonies a fourth movement is also found in the shape of a minuet and trio; and with this the external outline reaches completion. It was not, however, until 1788, the year in which Mozart wrote his greatest examples, that the symphony attained the rank of an important work of art. In these three works, the E flat, G minor, and C major symphonies, an extraordinary advance is visible both in expression and in richness of instrumental effect. Haydn, though born nearly twenty years before Mozart, wrote his most important symphonies during the eighteen years he survived his younger contemporary. But the symphony was brought to its most perfect stage of development by Beethoven. Not only did he determine the constitution of the orchestra and expand and elaborate the existing features of the different movements (see BEETHOVEN, Vol. II. p. 40), but to all this he added in his subject-matter a depth of human emotion such as hitherto had never come within the scope of musical expression. The essential qualities of his music are nobility of thought allied to perfection of detail, and a true balance between material and form. The *Eroica*, C minor, and A major stand as the most perfect examples of the classical symphony, and also mark the close of the classical period. For, as the perfection of the symphony was due to the increased value of the subject-matter, it was natural when the emotional domain of music became still more extended that composers should find themselves somewhat circumscribed by the limitations of the old form. Beethoven himself is an instance of this, for in the 9th Symphony he substitutes for the usual *finale* an elaborate choral setting of one of Schiller's odes. Succeeding writers have mostly

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aimed at a compromise between their poetical instincts and their regard for conventional rule. Among such may be mentioned Schubert, Spohr, Berlioz, Raff, and Schumann, the work of the last being the most important. Mendelssohn was content with the true classical form. The same may be said of Brahms, who, however, has enriched it with so many interesting and characteristic features as to constitute an important departure. See the article by Dr C. Hubert H. Parry in Grove's *Dictionary of Music*.

Sympleg'ades. See ARGONAUTS.

Symptoms. See DIAGNOSIS, MEDICINE.

Synagogue (Gr. *synagōgē*, 'assembly,' or 'place of assembly,' answering to Heb. *keneseth* or *beth-hakkeneseth*), a Jewish place of worship. The origin of this institution is probably to be traced to the period of the Babylonian captivity, although tradition finds it in the patriarchal times. When, through Ezra's instrumentality, the ancient order of things was restored in Judea, synagogues were established in all the towns for the benefit of those who could not take part oftener than three times a year in the worship of the temple at Jerusalem, and a special ritual of readings and prayers was instituted. From the time of the Maccabees we find them even in all the villages; and Josephus, Philo, the New Testament, the Mishna, and the Talmud constantly allude to them. Common prayer and religious instruction were the purpose for which the people there met. The Sabbaths and feast-days were the principal times on which the faithful assembled in them; there were short services also on Mondays and Thursdays; and the synagogues contributed more than anything else to the people's steadfast adherence to their religion and liberty. At the same time they gradually undermined the priestly and aristocratic element that gathered round the temple, its gorgeous worship and kingly revenues. Erected out of the common funds or free gifts of the community, the synagogue had also to be supported by taxes and donations. All profane doings were strictly prohibited in it; even as to dress the reverence due to the place was enforced as rigidly as possible. It represented in miniature the form of the temple, itself an enlarged type of the tabernacle; the faces of the congregation were turned towards Jerusalem. At the extreme eastern end was the holy ark, containing several copies of the Pentateuch, from which the periodical readings were chanted. Not far from this was suspended the ever-burning lamp. On a raised platform in the middle of the synagogue was the place of the reader or preacher. The women sat separated from the men by a low partition. The affairs of the synagogue were administered by a board of 'ancients' or 'elders,' at whose head stood a chief or principal (*Rôsh hakkeneseth*; Gr. *archisynagogos*). This college managed the inner affairs of the synagogue, and had even the power of excommunication. There was an officiating minister (*sheliach tzibbur*), whose office it was to recite the prayers aloud. The beadle, or *chazzan* (sometimes translated 'minister'), had the general charge of the sacred place and its books and implements. He had to present the scroll to the reader, and assist on other occasions. During the week-days he had to teach the children of the town or village. This name of chazzan, however, at a later period came to designate the officiating minister, and it has retained that meaning until this day. Almoners or deacons collected and distributed the alms. It need hardly be pointed out that the organisation, rites, and modes of worship of the Christian church in many respects closely resembled, if they were not modelled on, those of the synagogue.

'The Great Synagogue' (*keneseth haggedolah*) was long the current name for an assembly or synod, supposed to have been founded and presided over by Ezra, consisting of 120 men, said to have been engaged in remodelling the national and religious institutions of the Jews after the return from Babylon. The palpable chronological discrepancies that occur in the early accounts about this synod, together with other doubtful points, have led modern scholars to deny its existence completely, or, with Kuenen, to identify it with the temporary convocation of the people recorded in Nehemiah viii. It is, however, certain that Ezra and Nehemiah did a certain amount of work which they could not have done without being assisted by eminent collaborators. It was probably this body, however constituted, to which certain vital ameliorations in the administration of justice are ascribed; they developed public instruction, fixed and enlarged the Mosaic laws by certain rules of interpretation, and, according to the tradition, collected and redacted the sacred books.

See the articles JEWS, SANHEDRIM, RABBI; and Schürer's *History of the Jewish People in the Time of Christ* (Eng. trans. 5 vols. 1886–90).

Syncline. See ANTICLINE.

Syncope. See FAINTING.

Syncretism, a term derived from the habit attributed to the ancient Cretans of fighting fiercely amongst themselves, but combining resolutely against common external enemies, came to be used of theological compromise—between Catholics and Protestants, between Lutherans and Reformed. But the great syncretistic controversy was within the pale of the Lutheran Church, syncretism being applied by the High Lutheran party headed by Calovius to the principles of Calixtus and his school. Calixtus and the university of Helmstädt were held so far from Lutheran orthodoxy in the direction of the Calvinist theology as to be little better, or even rather worse, than the Reformed leaders themselves. The bitterness and rancour of the controversy were incredible, and were maintained with short truces till the death of Calovius (q.v.). See also CALIXTUS.

Syndic (Gr. *syn*, 'with,' and *dikē*, 'justice'), a name which has at different times and in different countries been given to various municipal and other officers. The accredited legal representative of a corporation, society, or company was in many cases designated by this title. In Geneva the chief-magistrate was formerly called the syndic. The syndics of cities in France, under the old régime, were officers delegated by the municipality as agents; the various trading companies in Paris and the university had also their syndics; and in the university of Cambridge the name is still applied to special committees of the senate.

Syndicate in the commercial world is used to indicate an association of merchants or others for the purpose of carrying through some great or important enterprise, or for securing a kind of artificial monopoly in the production or supply of some commodity. See MONOPOLY, STOCK-EXCHANGE.

Synergism (Gr. *syn*, 'together,' and *ergon*, 'work'), that deviation from the Augustinianism of Luther and the first stage of the Reformation which was regarded as a form of Semi-Pelagianism (see PELAGIUS). Melanchthon, who latterly taught expressly that the human will has 'the power of seeking grace,' and that in the work of grace there is co-operation between the Holy Spirit and man's will, was the chief representative of synergism.

Synesius, Bishop of Ptolemais in the Libyan Pentapolis, acted also the various parts of soldier,

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diplomatist, orator, philosopher, and poet. Born at Cyrene about 375 A.D., the contemporary of Augustine, he took pride in tracing his descent from the Heraclidæ, the royal family of Sparta, who first colonised the Pentapolis, and inherited wealth and estates in the interior. He studied at Alexandria under Hypatia (q.v.), whose influence over him proved a dominant and lifelong one. He used to turn to her for advice when in difficulty, and for sympathy when in trouble. He also studied in Athens, which disappointed him; and he returned to the Pentapolis, resolved to spend his life in study and in the pursuits of a country gentleman. Of hunting in particular he was passionately fond. About 399 he was appointed by his fellow-citizens a delegate from Cyrene to bring certain grievances before the Emperor Arcadius at Constantinople. He remained in that city for three years. In his speech 'On Kingship' Synesius warns Arcadius sternly of the perilous nature of the times, and points out the duties of a good king. During his stay at Constantinople a revolution took place, Arcadius was driven out by the Scythian general Gainas, and Aurelian, leader of the national party, banished. While waiting for an audience Synesius wrote a curious book entitled *Concerning Providence*. In the form of an allegory he describes the contest between Aurelian and Gainas, under the veil of a conflict between Osiris and Typhon, who personify Good and Evil; and deals with the question why God permits evil, and delays so long to interfere. In a few weeks Gainas fell, Synesius attained the end of his mission, and sailed for home. The voyage from Alexandria was a perilous one, which Synesius describes in a long and delightful letter. The next eight years were a time of peace and happiness for Synesius; 'books and the chase,' he writes, 'make up my life.' About 403 he married a wife belonging to Alexandria. During these years he wrote his treatise *Concerning Dreams*, a half-burlesque essay, *The Praise of Baldness* (he was bald himself), his *Dion, or on Self-discipline*, setting forth his ideal of the philosopher, the second part of his book on Providence, several *Hymns*, and a great many letters. This peaceful period was interrupted by war. The Libyan nomads made raids upon the fertile Pentapolis; there were no soldiers at Cyrene, but Synesius raised a troop of volunteers. The helpless governor Cerealius fled; Cyrene was besieged, and Synesius had to organise and direct the defence of the city.

Up to this time Synesius appears before us as a man of letters, steeped in Greek literature and philosophy, and standing quite outside of Christianity. Doubtless the horrors of war and barbarian invasion forced upon his mind the weakness of Neoplatonism. In 411 the people of Ptolemais, fearing the appointment of a corrupt governor, fixed on Synesius as their bishop. Synesius was most unwilling; in *Ep.* 105 he tells his difficulties and scruples; but at last he yielded, and was consecrated at Alexandria in 410. From this time to his death his life was burdened and weighed down by constant private troubles and public calamities. On his return to Ptolemais he found the new governor Andronicus playing the tyrant, boldly excommunicated him, and secured his recall. As a bishop Synesius acted with great prudence and decision, yet his conscience troubled him, and he felt he had been presumptuous in undertaking such an office. The Ausurians invaded the country, and Synesius had again to spend his nights on the ramparts and direct the defence. His only surviving child died. Synesius was broken with troubles, and both his philosophy and his religion appeared to fail him in his need. The city was relieved, but he fell ill; and about 413 he died. His last letter was written to Hypatia, who retained all his old affection and reverence. His last *Hymn*, with its humble prayer for deliverance from indwelling sin, contrasts strongly with the Neoplatonic doctrines of the earlier hymns. Hypatia's name for him, 'the good of other people,' indicates the unselfishness of his nature. His 156 letters reveal to us a character fascinating in many ways, a man open-eyed, of high spirit and awake to every call of duty, sound and healthy in body and mind, passionately fond at the same time of intellectual pursuits and of sport, not without vanity, but with no sensual element. In many ways he reminds us of Charles Kingsley. The *Hymns* show Synesius as the poet of Neoplatonism; their keynote is the longing of the soul to rise to intellectual communion with God.

See editions by Turnebus (1553), Migne (text inaccurate; 1859), German trans. by Krabinger, accompanied by revised text and notes (1825–50), and books on Synesius by Druon, *Sur la Vie et les Œuvres de Synesius* (1859), and Volkmann (1869). In T. R. Halcomb's article (Dr Smith's *Dictionary of Christian Biography*) his philosophical and religious belief, and in Miss A. Gardner's book (S.P.C.K., 1886) his relation to the history of the time, are excellently described.

Synod. See COUNCIL, PRESBYTERIANISM.

Synovial Membrane, which facilitates the gliding of a tendon of a muscle or of the integument over a projection of bone; see JOINTS, p. 350.

Synthesis (Gr. *synthesis*, 'a putting together'), in Chemistry, is a term applied, in contrast to Analysis (q.v.), to the building up of compound substances from the elements they contain or from other compounds usually of less complexity than themselves. The term was formerly applied more particularly to the 'artificial' formation by the ordinary processes of the laboratory of substances which were at one time only obtainable as themselves products of the vital processes of plants or animals, or as derivatives from such products. Later the term was especially applied to the building up of complex carbon compounds; the greater part of modern organic chemistry consisting of such synthesis of new compounds of carbon. In the latest work on the synthetical methods for the preparation of organic compounds (that by Elbs, see below) the signification of the term has been still further restricted by the author (quite arbitrarily, however) to those operations only which give rise to compounds resulting from a new union of carbon with carbon.

Syntheses of new organic compounds are frequently the result of chance discoveries of new reactions, but a very large number of such reactions of more or less general applicability have been studied and classified, so that a new synthesis may be the result of a deliberate attempt to produce a new compound of a definite composition. Similarly the constitution of an important compound occurring in nature, such as, for instance, an alkaloid, is often known with tolerable certainty from the products yielded by it in a series of decompositions, and the information which has been gained from these decompositions indicates the lines upon which an attempt at synthesis may be made with a fair prospect of success. The mode of procedure indicated in the foregoing sentence has resulted in the synthetical or artificial production of numerous substances useful in the arts, in medicine, for domestic purposes, &c. As instances of substances naturally occurring in, or obtainable from, plants or animals, which have also been prepared synthetically, the following may be mentioned: indigo; alizarine, the colouring matter from madder; vanilline, the flavouring principle of the vanilla pods; citric acid, the acid of lemons; urea; uric acid, &c. Amongst the most

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familiar of synthetically prepared compounds not known as occurring naturally are a large number of the so-called coal-tar colours, saccharine, and many other coal-tar products, &c.

For further information, any large text-book of chemistry may be consulted; for instance, Roscoe and Schorlemmer's *Treatise on Chemistry*. Special works on organic synthesis are Lellmann's *Principien der oryanischen Synthese* (1887) and Elbs's *Synthetische Darstellungsmethoden der Kohlenstoff-verbindungen* (1889–91).

Syntonin (also called Muscle Fibrin), a substance akin to fibrin, which is an important constituent of muscular tissue. See MUSCLE, p. 354, FIBRIN, PROTEIDS, and ANIMAL CHEMISTRY.

Syphilis is a markedly contagious, infective, and inoculable disease. It gains entrance at a wounded spot, and from thence gradually infects the body. It may manifest itself during the whole of the patient's life, and is capable of being transmitted to the offspring. It has many analogies with the exanthemata, and may be regarded as one of the most important of that group. Syphilis (other than hereditary) can only be propagated by direct contagion or by the transmission of the virus through some vessel or medium which has recently been contaminated. It is most commonly caused by impure sexual intercourse. As the result of this, after a symptomless incubation period of about three weeks, there forms at the point of infection a single painless ulcer, with a hard cartilaginous base and scanty secretion known as the *Primary Sore—Hard Chancre*.—Associated with this a change is seen in the nearest glands into which the lymphatics of the ulcerated spot discharge, and this change extends to all the lymphatic glands of the body. They are enlarged, bullet-like, painless, and do not become matted together as in ordinary inflammations. The sore and glandular enlargement constitute the *primary stage* of syphilis, and last from the date of inoculation for about eight weeks. This is followed by the *secondary stage*. It may be preceded by malaise, headache, and fever, and is characterised by skin eruptions, variable in kind and duration, which are symmetrical, do not itch, fade, and leave no trace. Amongst the first is a brownish-pink evanescent mottling—*Roseola*—on the chest, abdomen, and flanks. This is succeeded by a papular rash, which in its turn frequently assumes a more scaly appearance—*Psoriasis*. Similar changes are seen in the mouth, on the tongue, and about the anus, in the form of mucous patches, cracks, fissures, shallow ulcers, and condylomata. The hair is frequently shed, and crusts form on the scalp. Syphilitic inflammations of the eye (*Iritis*), ear, testes, and periosteum also occur.

The secondary symptoms go on for about a couple of years, become more irregular in duration and character, and gradually cease as the period of the *tertiary stage* develops. This may show itself long after the cessation of secondary symptoms. The disease is no longer contagious, but the lesions which arise are much more serious to the patient. Masses of cells of low vitality, known as gummata, non-vascular, with a pronounced tendency to break down and ulcerate, may arise in any of the tissues. They are asymmetrical and are specially prone to affect the connective tissue, skin, bone, muscle, and viscera. They frequently simulate malignant tumours, and are a fertile source of many of the diseases of the brain and spinal cord, giving rise to epilepsy and various forms of paralysis. In some instances tertiary syphilis is lifelong, and resists treatment most obstinately.

The precise nature of the syphilitic virus is at present unknown. There is reason to believe that a micro-organism similar to that of tubercle is the cause. This would seem to proliferate in the primary sore, to be carried along the lymphatics, and so to infect the whole of the tissues. Attempts to excise the sore have not met with success in preventing the disease. Syphilis is one of the most frequent causes of abortion, and the infants of syphilitic parents show the manifestations of secondary syphilis in the form of skin eruptions. In more advanced life hereditary syphilis is recognised amongst other things by the irregular and peg-shaped teeth, the depressed broken-like nose, and traces of inflammation of the cornea. It is noteworthy that the mother sometimes displays no evidence of the trouble, her children cannot infect her, while they may readily infect their nurse and other healthy people with whom they are brought in contact.

The treatment of syphilis requires that one should aid the elimination of the disease, combat the anæmia caused by it, antagonise the tendency to the formation of gummata, and prevent the spread of the infection. It is necessary to warn the patient that during the whole of the primary and secondary stages he is a cause of danger to others, and that, while his normal evacuations are innocent, the discharges from any sore or abraded surface and his blood are most virulent. Hence the utmost care must be taken to avoid contagion through the medium of the utensils he uses at meal-time, &c. He should lead a regular life, taking due exercise and avoiding strains and excess of all kinds. The anæmia and the syphilitic virus itself are met by the administration of mercury. This should be given in small doses over a prolonged period, say of twelve to eighteen months, with frequent short breaks. By this means the secondary symptoms are alleviated, and the tertiary stage may be prevented.

In later secondary eruptions iodide of potassium may be combined with the mercury, and in tertiary conditions the iodide alone is indicated. Large doses of iodide—10 or 15 grains thrice a day—are frequently required in cerebral and spinal syphilis. The patient who suffers from syphilis should not be allowed to marry until he has passed six months without showing any evidence of secondary mischief, and that too without taking mercury. At least two years should have elapsed since he contracted the disease.

In the event of a mother producing syphilitic children she alone should be allowed to nurse them. As a rule syphilis is very amenable to treatment, provided the patient be otherwise strong and leads a regular life. Syphilis is a disease of remote antiquity, and is found all over the globe. It is now probably becoming much milder in its effects, although occasionally local outbreaks do occur which display all the malignancy which characterised it during the middle ages.

The extraordinary prevalence of this disease during the latter part of the 15th century led to the unfounded belief that it had come from the New World with the Spanish navigators, though the name *Morbus Gallicus*, or the Neapolitan Disease, was that now commonly given. It seems probable that at an earlier date, when its cause had not been recognised, it was often confounded with other diseases, such as leprosy. The word was borrowed from the name of a hero in Fracastoro's poem *Syphilidis Libri III*. For its history and treatment (including *Syphilisation*, a suggested method of securing a mild form of the illness and subsequent prevention by inoculation), see Häser, *Geschichte des Medicins*; Rosenbaum, *Die Lustseuche im Altertum* (1888); and the Manuals by Lancereaux (1869), Lee (1875), Cooper (1884), Hutchinson (1887), and Von Zeissl (New York, 1887).

Syra (Gr. *Syros*), the most important, though not the largest of that group of islands in the Ægean Sea known as the Cyclades (see GREECE). It is about 10 miles long by 5 broad, has an area of 42½ sq. m., and is bare, rocky, and not very

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fertile. Its prosperity is of quite modern growth. During the War of Independence Syra remained neutral, hence many fugitives of commercial enterprise flocked thither from Chios and other parts of Greece. Pop. of island (1889) 31,573. The capital, *Syra*, or *Hermoupolis*, is situated on a bay on the east side of the island. It rises terrace-wise from the shore, is well built, and is the seat of government for the Cyclades, and the seat of a Roman Catholic bishop. This port is the chief commercial entrepôt of the Ægean. Every year it imports, principally manufactured wares (one-third of total), hides, grain and flour, yarns, timber, iron, salt-fish, rice, and coal to the average value of £1,210,500 (£685,650 supplied by Great Britain), and exports tobacco, emery-stone, valonia, sponges, and fresh vegetables to the average value of £103,280.

Syracuse, anciently a famous city of Sicily, situated on the south-eastern coast of the island, 80 miles SSW. of Messina, was founded by Corinthian settlers about 733 B.C. The colonists seem to have occupied the little isle of Ortygia, which stretches south-east from the shore. The settlement rapidly rose to prosperity, and towards the end of the 6th century B.C. sent out colonies of its own. Little is known of the early political state of Syracuse; but about 485 the ruling families, probably descendants of the original colonists, were expelled by the lower classes of citizens. Gelon (q.v.), despot of Gela, restored the exiles, and at the same time made himself master of Syracuse. He increased both the population and the power of his new state, and won the highest prestige by a great victory over the Carthaginians at Himera. In his time Achradina, a triangular tableland north of Ortygia and on the adjoining mainland, was built upon. This ultimately became the most extensive and populous quarter: it contained the Agora, a temple of Zeus Olympius, the Prytaneum, with a splendid statue of Sappho and fine monuments to Timoleon and the elder Dionysius (q.v.), &c. At a later date, and possibly thus early, there were two other quarters in the city—Tyche, occupying a plateau to the west of Achradina; and Neapolis (New City), stretching along the southern slopes of the plateau, and overlooking the marshes of the Anapus and the Great Harbour, a spacious and well-sheltered bay to the south-west of Ortygia. This islet, however, contained the citadel, which overlooked the docks in the Lesser Harbour on the north.

Hiero (q.v.), the successor of Gelon, was celebrated throughout the Greek world as a patron of the fine arts and of men of genius, as Æschylus, Pindar, &c. In 467 B.C. the democracy again got the upper hand—Thrasybulus, Hiero's brother and successor, a 'tyrant' of the baser sort, being expelled; and for sixty years a free and democratic government was enjoyed, under which Syracuse flourished more than it had ever done. During this period occurred the great struggle with Athens (415–414 B.C.), and the celebrated siege by the Athenian armament, a contest in which the Sicilian city came off victorious. Nine years later Dionysius (q.v.) restored the 'tyranny' of Gelon, and during a reign of nearly forty years greatly increased the strength and importance of the city (see SICILY). It was he who constructed the docks in the Greater and Lesser Harbours, and surrounded the city with fortifications. His fierce war with Carthage (397 B.C.) raised the renown of Syracuse still higher. The reigns of the younger Dionysius (q.v.) and of Dion, the friend of Plato, were unsettled; but after the restoration of public liberty by Timoleon (343 B.C.) a brief season of tranquillity ensued. In 317 B.C., twenty years after the death of the noble Timoleon, Agathocles, a rude soldier of fortune, once more restored the despotic form of government, which continued, with scarcely an interruption, through the reign (fifty years) of the enlightened Hiero II., the friend and ally of Rome, down to the conquest of the city by the Romans after a siege of two years, in which Archimedes perished (212 B.C.). This event was occasioned during the Hannibalic war by Hieronymus, a rash and vain young man, abandoning the prudent policy of his grandfather, Hiero (q.v.), breaking the alliance with Rome, and joining his and their foes, the Carthaginians. Under the Romans Syracuse slowly declined, though with its handsome public buildings and its artistic and intellectual culture, it always continued to be the first city of Sicily. It was captured, pillaged, and burned by the Saracens in 878 A.D., and after that sunk into complete decay. For ancient Syracuse, see Freeman's *History of Sicily*.

The modern city (*Siracusa*) is confined to the original limits, Ortygia, which, however, is no longer an island, but a peninsula. The streets, which are defended by walls and a citadel, are, with few exceptions, narrow and dirty. Syracuse has a cathedral (the ancient temple of Minerva), a museum of classical antiquities, a public library, with some curious MSS., numerous churches, monasteries, and nunneries, the ancient fountain of Arethusa (its waters mingled with sea-water since the earthquake of 1170), and remains of ancient Greek and Roman temples, aqueducts, the citadel Euryalus, a theatre, an amphitheatre, and quarries, besides ancient Christian catacombs. The people manufacture chemicals and pottery, and trade in fruits, olive-oil, wine (exports), wheat, timber, and petroleum (imports) to the annual value of a quarter of a million sterling. Pop. 19,389.

Syracuse, an important city of central New York, seat of Onondaga county, lies in the beautiful Onondaga valley, stretching along Onondaga Creek to the head of the lake of the same name. It is on the Erie Canal, and is a terminus of the Oswego Canal; by rail it is 148¼ miles E. of Buffalo and 147½ W. of Albany. Syracuse is the seat of a Methodist Episcopal university (1870), open to both sexes. It carries on extensive manufactures, the most notable being salt, of which some 6,000,000 bushels annually is produced. The city possesses rolling-mills, Bessemer steel-works, foundries, blast-furnaces, boiler-factories, and manufactories of engines, farming implements, furniture, doors and blinds, picture-frames, silver-ware, musical instruments, saddlery, boots and shoes, flour, beer, &c. The salt-springs were visited by French missionaries as early as 1654, and began to be worked by white men in 1789; the city was incorporated in 1847. Pop. (1880) 51,792; (1890) 88,143.

Syr-Daria. See JAXARTES.

Syria, a country of western Asia, embracing the regions that lie between the Levant and the Euphrates from Mount Taurus in the north to the southern border of Palestine, or even to the peninsula of Sinai. The eastern boundaries south of the Euphrates are not clearly defined or marked off from the wide expanse of the Arabian desert. The physical conformation of Syria is throughout simple and uniform. A range of mountains, split in the north into two parallel chains—Libanus and Anti-Libanus—fronts the Mediterranean, ranging in height from 6000 feet in the north up to 10,000 feet in the central parts, but falling again in the south to 3500 feet. Behind these mountains lies a table-land, that gradually falls away eastwards to the desert. The separate districts of Syria have

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been already described in geographical detail in the articles LEBANON, PALESTINE, PHŒNICIA, BASHAN, HAURAN, DEAD SEA, JORDAN. The prevailing winds being westerly, the slopes of the mountains next the Mediterranean and the valleys ensconced among them, together with the immediate seaboard, get a tolerably plentiful supply of moisture during the rainy half of the year (October to May); snow even falls on the highest summits of the mountain-ranges. The climate on the plateau is generally dry, and in certain localities hot. The valley of the Jordan is remarkably hot. The soil is in many parts possessed of good fertility, and in ancient times, when irrigation was more extensively practised, yielded a much greater return than it does at the present time. Damascus is noted for its gardens and orchards. Hauran produces excellent wheat. Northern Syria is the home of the olive. The vine grows in nearly all parts of the country. Fruit (oranges, figs, &c.) is cultivated on the coast plains. Sheep and goats are the most important of the domestic animals. The principal exports are silk (£405,000 to £665,000 annually), cereals (£150,000 to £300,000), wool, olive-oil, lemons and oranges, soap, sponges, sesame, liquorice, cottons, and tobacco. The total value is about 1 to 1½ million pounds sterling. The imports reach pretty nearly the same figure; but all the statistics affecting Syria are very imperfect. Manchester goods (£768,000 to £944,000) constitute the chief item in the imports. Besides these there are woollens, rice, copper and iron, sacking, timber, and hides. The chief port is Beyrout, and to it must be added Acre, Caiffa (Haifa), Tyre, and Tripoli. Railways, to connect Damascus with Acre and with Beyrout, and Tripoli with the interior, are projected. The population is estimated at 2,677,000 and at 1,450,000, and again at about 2,000,000. The bulk of the inhabitants are Mohammedans, but do not all profess the orthodox Sunnite creed: for instance, there are the Druses (q.v.), certain sects of Shiites, and others. The Christians make up about one-fifth of the total (see below). The principal ethnic elements in the population are descendants of the ancient Syrians (Aramæans) and Arabs, these last both settled and nomad; besides there are Jews, Turks, and Europeans.

The earliest historical records that treat of Syria are those that relate the histories of the Hittites (q.v.), the Phœnicians (q.v.), and the Hebrews (see JEWS). The first named were for several centuries supreme in northern Syria, and at times stretched their authority southwards as far as the hills of southern Palestine. Yet they had most formidable rivals on both sides of them in Assyria and Egypt, from both of which countries their subjects derived no small share of their skill in manufacturing industry, and in the arts and manners of life. The other two peoples mentioned occupied the most prominent place in southern Syria. Nevertheless at different periods we read of flourishing Aramæan (Semitic) principalities, such as Damascus, Hamath, Zobah, and similar petty states. These, as well as most of northern Syria, were conquered during the 8th century B.C. by the kings of Assyria; the Jewish kingdoms experienced the same fate at the hands of the Babylonian kings in the 7th and 6th centuries. As previous to the 9th century B.C. Syria had been the battle-ground of the Egyptian and Hittite armies, so after that period it was, as a province of Assyria (Babylonia), involved in the struggle between that great empire and Egypt. (The Greeks first knew this region as a province of Assyria; hence the contracted name Syria.) Towards the end of the 6th century B.C. Syria fell under the dominion of the Persian empire; and two centuries later it was conquered by Alexander of Macedon. When his empire broke to pieces the Seleucidæ (q.v.) made Antioch the capital of their empire of Syria. From the Seleucidæ it passed, through the hands of Tigranes of Armenia, to the Romans, for whom it was won by Pompey in 64 B.C. Under these new masters the country flourished and became celebrated for its thriving industries, its commercial prosperity, and its architectural magnificence (see BAALBEK, PALMYRA; also NABATÆANS). On the division of the Roman world Syria became part of the Byzantine empire, and of it remained a province until its conquest by the Mohammedan Arabs in 636. It still continued to be prosperous under the Arabs and their successors the Egyptian sovereigns, in spite of the unsettled period of the Crusades (q.v.). The first severe blow it suffered came from the Mongols in 1260, and its ruin was completed when in 1516 it passed from the Egyptians to the Ottoman Turks, its present rulers.

See Burton and Drake, *Unexplored Syria* (2 vols. Lond. 1872); Lady Burton, *Inner Life of Syria* (1875); Von Südenhorst, *Syrien und seine Bedeutung für den Welthandel* (Vienna, 1873); Lortet, *La Syrie d'Aujourd'hui* (Paris, 1884); Baedeker's *Palestine and Syria* (by Professor A. Socin); C. R. Conder, *Heth and Moab* (1883); De Vogué, *Syrie Centrale; Architecture Civile et Religieuse du Ier au 7me Siècle* (Paris, 1865-77); and books quoted under the various articles cited above.

The *Church of the Syrian Rite* was that portion of the oriental church which had its seat in Syria, and which was anciently comprehended in the patriarchate of Antioch and (after that of Jerusalem obtained a distinct jurisdiction) partly in the patriarchate of Jerusalem. The Syrian Church of the early centuries was exceedingly flourishing; before the end of the 4th century it numbered 119 distinct sees, with a Christian population of several millions. The first blow to its prosperity was the fatal division which arose from the controversies on the incarnation (see EUTYCHES; GREEK CHURCH, Vol. V. pp. 397-399). The Eutychian heresy, in one or other of its forms, obtained wide extension in Syria; the Moslem conquest accelerated the ruin thus begun; and from the 7th century downwards this once flourishing church declined into a weak and spiritless community, whose chief seat was in the mountains, and whose best security from oppression lay in the belief on the part of the conquerors of its utterly fallen and contemptible condition. In Syria there are now, beside the dominant Moslems and the Druses (q.v.), orthodox Greeks, United Greeks, United Syrians, and Maronites (q.v.)—the three latter in communion with the Roman Catholic Church (q.v.), besides Protestant missions. See also NESTORIANS. For the Syrian Liturgy, see LITURGY, Vol. VI. p. 661; for Syriac, SEMITIC LANGUAGES; and for Syriac versions of the Bible, see BIBLE, Vol. II. p. 126.

Syringe (Gr. *syrinx*, 'a pipe'), a hydraulic instrument, consisting of a cylinder of metal or glass, having a conical nozzle at one end, and the other fitted with an air-tight piston. The nozzle being inserted in a liquid, the retraction of the piston draws the liquid into the cylinder, on the principle of the Pump (q.v.), and by its forward pressure the liquid is expelled from the nozzle in the form of a jet. See CLYSTER.

Syrtis, the ancient name of two gulfs of the Mediterranean Sea, on the north coast of Africa. The Syrtis Major, now called the Gulf of Sidra, lies between Tripoli and the tableland of Barca, and forms the most southern part of the Mediterranean. The Syrtis Minor, now called the Gulf of Cabes, lies between Tunis and Tripoli. The shores of both are inhospitable, and abound in quicksands.

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Syrup (Fr. *syrop*, Span. *xarope*, Arab. *shurâb*, 'a beverage,' 'wine,' 'syrup.' *Shrub* is a doublet; and *sherbet*, Arab. *sharbât*, is from the same root), in its simplest meaning, a saturated solution of sugar boiled to prevent fermentation; but it also means the juice of fruits saturated with sugar and many flavoured liquids, treated in the same way. Generally speaking, the finest refined sugar is used; and every effort is made to get the syrup very clear and free from all feculent matter. Syrups of fruits are much used on the Continent to mingle with water for drink, and are very wholesome. The 'golden syrup' of the grocer is the uncrystallisable finally separated in the manufacture from crystallised sugar (see SUGAR). Medicinal syrups contain with the sugary element some therapeutic agent. Parrish's Syrup contains the phosphate of iron with the phosphates of lime, potash, and soda, dissolved in dilute phosphoric acid, sugar being added. Easton's Syrup has in it phosphate of iron, with the phosphates of quinine and strychnine. There are syrups of the hypophosphites, and many others.

Syrus, EPHRAEM. See EPHRAEM SYRUS.

Syrus, PUBLIUS or PUBLILIUS, a Roman writer of mimes who flourished about 43 B.C., and was most probably a Syrian slave brought to Rome in early youth, educated, and freed by some indulgent master. After Laberius he reigned supreme on the stage, and his mimes, being as full of shrewd epigrammatic wit as broad humour, did not altogether perish with him. About two hundred apophthegms are still extant, under the title *Publilii Syri Mimi Sententiæ*. One of these supplied the motto for the *Edinburgh Review*, although Sydney Smith admits that none of the young collaborators knew anything further of its author: 'Judex damnatur cum nocens absolvitur.'

Syzran, a town of Central Russia, a few miles from the right bank of the Volga, and 90 miles S. of Simbirsk. Laid out in 1685, it has tanneries and noted market-gardens, and a large trade in grain, timber, salt, and manufactured goods. Pop. 28,624.

Syzygy (Gr. *syzygia*), a term used indifferently either for the Conjunction (q.v.) or opposition of the moon.

Szabadka, or MARIA-THERESIOPEL, a royal free town of Hungary, stands on the plain that lies between the Danube and the Theiss, 106 miles S. by E. of Budapest by rail, and is the centre of a rich agricultural district, with a trade in cattle, skins, wool, corn, fruit, tobacco, &c. Pop. (1881) 61,367; (1890) 73,526.

Szarvas, a town of Hungary, on the river Körös, 80 miles SE. of Budapest. A good breed of horses is cultivated here. Pop. (1890) 24,391, mostly Slovaks, who, however, speak Hungarian.

Szathmar-Nemethy, a town of Hungary, on the Szamos, 68 miles by rail NE. of Debreczin, with a Roman Catholic cathedral, and a trade in wine. Pop. (1890) 20,613.

Sze-chwan, the largest province of China, 185,000 sq. m. in area, is situated in the west, having Tibet on the north-west and Yunnan on the south-west; the remaining boundaries are conterminous with various provinces of China. It is traversed and watered by the Yang-tsze-Kiang and its affluents, is hilly throughout, mountainous in the west, and rich in natural products, including coal, iron, and other minerals. Opium, silk, salt, sugar, medicines, tobacco, hides, musk, rhubarb, and white wax (produced by an insect) are exported to the annual value of £5,000,000; and European cottons and woollens are imported to the value of £3,000,000 annually. The capital is Ching-tu, the chief commercial town Chungking, on the Great River, which was opened to British trade in the end of 1889. Ichang (q.v.) was thrown open to foreign trade in 1877. Pop. (1885) 71,000,000, a prosperous, peaceful, and contented people. See A. Hosie, *Three Years in Western China* (1890).

Szegedin, a royal free town of Hungary, stands at the confluence of the Maros with the Theiss, 118 miles by rail SE. of Budapest. This town was almost completely destroyed by a terrible flood in March 1879, out of 6566 houses 6235 being overwhelmed. Since then it has been rebuilt, and now possesses very handsome public buildings, including a town-house, post-office, law-courts, theatre, barracks, &c., and is protected against inundations by a double ring of embankments. The Theiss is spanned by a couple of railway bridges and a fine suspension bridge (1940 feet long), designed by Eiffel. Szegedin manufactures soap, spirits, matches, soda, tobacco, coarse cloth, &c., and carries on an extensive river-trade in wood, corn, and wool. A speciality of the place is *paprika*, a kind of capsicum. From 1526 to 1686 it was occupied by the Turks. Close by Haynau defeated the Hungarians on 3d August 1849. Pop. (1880) 73,675; (1890) 87,410.

Szenta. See ZENTA.

Szentes, a town of Hungary, 30 miles N. of Szegedin, near the left bank of the Theiss. Pop. (1880) 28,712; (1890) 30,758, chiefly engaged in the wine-culture.

Szolnok, a town of Hungary, on the Theiss, 66 miles by rail E. by S. of Budapest, with a lively trade in tobacco, timber, and salt. Pop. (1880) 18,247; (1890) 20,640.

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T

the twentieth letter in our alphabet, is derived from the Greek letter *tau*, which corresponds in position, name, form, and value to the Semitic letter *tau*, a name which denoted the 'sign' or 'cross' used in marking the ownership of cattle. Whether, like most of the other letters, it was derived from the Egyptian hieroglyphics is uncertain. If so it must be referred to the hieroglyphic picture usually called the lasso or noose, but which is probably the picture of a tongne (see ALPHABET). The oldest Semitic forms are ×, which appears in the 9th century B.C. on the Moabite Stone, and †, found about a century earlier in the Baal Lebanon inscription. This earlier form was transmitted to the Greeks unaltered, save that, even in the earliest inscriptions, those from Thera, we have the form T, the vertical stroke not projecting above the horizontal bar. The Romans retained the Greek form of the letter, and it was not till the 12th century A.D. that in the minuscule (t) we have a reversion to the older form.

The sound of *t* is that of the hard dental mute, and is produced by the tip of the tongue being brought into contact with the base of the upper teeth, or, as in *trance*, with the front of the hard palate. The difference between *d* and *t* is that the first is voiced or soft, and the second voiceless or hard. By Grimm's Law (q.v.) a primitive *t* becomes *th* in Low German and *d* in Old High German. Thus the Latin *tu* and *tres* become *thou* and *three* in English, and *du* and *drei* in German. A primitive *d* becomes *t* in Low German, and *z* in Old High German. Thus the Latin *duo*, *decem*, and *dens* become *two*, *ten*, and *tooth* in English, and *zwei*, *zehn*, and *zahn* in German. A primitive *th* (*dh*) becomes *d* in Low German, and *t* in Old High German. Thus the Greek *thugatēr* is *daughter* in English, and *tochter* in German.

A final *n*, *s*, or *r* often attracts an intrusive *t*, as in the words *tyrant*, *parchment*, *cormorant*, *ancient*, *pheasant*, *against*, *amongst*, *amidst*, *behest*, or *thwart*. A final *t* sometimes disappears, as in *anvil* or *petty*. A *t* followed by *i* or *y* may lapse into the sound of *sh*, as in *nation*; or if followed by *u*, sounded as *iu*, it may become *tsh*, as in *nature*. A final *c* may also become *tch*, as in *thatch* or *watch*. A *t* may become *d*, as has happened with the words *proud*, *bud*, *diamond*, and *card*; or *d* may become *t*, as in *clot*, *abbot*, and *partridge*. In Latin a *t* is assimilated before *s*, as in *missi* from *mitto*, and at the end of a word only one *s* is retained, thus giving *virtus* for *virtut-s*, *sors* for *sort-s*, or *compos* for *compot-s*. English, Welsh, Spanish, and Greek are the only languages which possess the difficult aspirated sound of *th*. In French loan-words, as *thé* and *théologie*, the *th* is pronounced as *t*, and the same is now the case in German, as in the words *thal*, *thier*, and *thun* (now often spelt *tal*, *tier*, *tun*).

Tabard (most probably, like *tippet*, ultimately from Lat. *tapete*, 'hangings'), a heavy outer coat of rough cloth once worn by poor people; also a loose cloak without sleeves worn by knights over their armour, usually embroidered with their arms —Chaucer's *cote-armour*. The latter use survives in the distinctive coat with short sleeves, worn by heralds and pursuivants, emblazoned with the royal arms.

Tábari, a Moslem historian. See ARABIAN LANGUAGE, Vol. I. p. 365.

Tabasheer, a substance sometimes found in the cavities or tubular parts of the stems of bamboos and other large grasses. It consists chiefly of silica with a little lime and vegetable matter, or sometimes of silica and potash, in the proportions of about 70 parts of silica and 30 of potash. It appears to be formed by extravasation of the juices of the plant, in consequence of some diseased condition of the nodes or joints. It is in high repute among the Hindus as a tonic, and is prepared by imperfect calcination and trituration. The powder is often chewed with betel in order to renovate the constitution. There are several varieties of tabasheer, one of which, of very rare occurrence, is extremely beautiful, of a delicate azure colour by reflected light, and of a faint yellowish hue by transmitted light, easily crushed between the fingers, and of 'an aerial and unsubstantial texture, which we look for in vain in any other solid.' Other varieties are yellowish, white, and much like some varieties of opal. Tabasheer is very porous, and absorbs water and oil very rapidly; effervescence taking place when it is plunged in water. By absorption of oil the opaque varieties become transparent. When the greater part of the oil is expelled by heat the structure of the tabasheer becomes apparent; it is beautifully veined, the veins being sometimes parallel and sometimes curved. The optical properties of tabasheer are remarkable. Of all known substances it has the lowest refractive power.

Tabernacle (Lat. *tabernaculum*, 'tent'), the portable tent in which the Ark of the Covenant (q.v.) was conveyed, and as such the sanctuary of Israel. It seems (1 Sam. iii. 3) to have been superseded by a more permanent building at Shiloh before David's time. See TEMPLE.—In Roman Catholic churches the name is given to the receptacle in which the consecrated elements of the Eucharist are retained. It is commonly a small structure of marble, metal, or wood, placed over the high altar, and appropriated exclusively to the reservation of the Eucharist, no other object whatever being allowed to be kept in it. See PYX, and the illustration at ALTAR; and for the Feast of Tabernacles, see FESTIVALS.

Tabes Dorsalis. See LOCOMOTOR ATAXIA.

Tabes Mesenterica. See MESENTERY, and TUBERCLE.

Tablature, a method of musical notation, principally employed in the 15th and 16th centuries for the lute, but also used occasionally for other instruments. In tablature the lines of the stave indicate the strings on the instrument, the upper line representing the first string, the second line the second string, &c. The notes are expressed either by Arabic numerals or small letters, which

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denote the semitones of the chromatic scale, or the frets at which the fingers ought to be placed to stop the strings—*a* indicating the open string, *b* the first fret, *c* the second fret, and so on. The duration of the sounds is expressed by minims, crotchets, quavers, &c. placed above the stave, over the letter or letters which they are meant to affect, and each of the musical notes is held to apply to the letters immediately following, making them of the same length as the first, until some new note occurs. The method of tuning the lute must be ascertained before any particular tablature can be deciphered, as the pitch of the notes produced by the use of the frets will depend upon that of the open strings. One of the best-known tablatures is that given in the famous Skene manuscript in the possession of the Faculty of Advocates, Edinburgh, written at various times up to 1635.

Tableaux Vivants ('living pictures'), representations of works of painting and sculpture, or of scenes from history or fiction, by living persons. They are said to have been invented by Madame de Genlis, when she had charge of the education of the children of the Duke of Orleans. They were long common in theatres, as they are now in private circles.

Tablelands, or PLATEAUS, are extensive elevated regions with a plain-like or undulating surface. They may be bordered by steep declivities falling more or less suddenly from the level of the plateaus to the sea or the adjacent low grounds; or they may slope down imperceptibly and thus gradually merge with the lowlands. The tableland of the Spanish Peninsula is a good example of a plateau that rises abruptly from the sea. The 'Great Plain' lying east of the Rocky Mountains, on the other hand, is a plateau that sinks gradually from a height of 6000 feet down to the low prairie lands of the Missouri. Some high tablelands are surrounded by lofty mountains, such as those of Quito, Titicaca, and Uspallata in the Andes, and that of the Pamir in Asia; while others constitute elevated platforms upon which mountain-ranges stand. Two types of tableland are recognised: (*a*) *plateaus of accumulation* and (*b*) *plateaus of denudation*. The former are built up of horizontal or approximately horizontal strata, while the latter are composed of disturbed strata which have been planed down to one general level (see MOUNTAINS). The chief tablelands are in Europe, central Spain; in America, Oregon, the great salt plain of Utah, the north and centre of Brazil; in Africa, the interior of Barbary; while in Asia almost the whole of the south and centre of the continent consists of plateaus, which rise terrace above terrace till they culminate in that of Tibet. Of the Asiatic plateaus the principal are those of Asia Minor (3280 feet above sea-level), Armenia (7000), Persia or Iran (3000), Mysore (4000 to 5000), Deccan (1500 to 2000), Tibet (12,000 to 17,000), and Chinese Tartary (3000 to 4300).

Table Mountain. See CAPETOWN.

Table-turning, a phenomenen attributed, with other more eccentric movements of furniture, to the agency of spirits (see SPIRITUALISM), but practised also in America and Britain from about 1850 as a kind of social pastime; the motion of a table under the finger-tips of a closed circle of 'believers' standing round the edge of the table being referred to a mysterious or occult origin, and not, as by the more sceptical, to the collective but involuntary muscular action of the circle of friends.

Taboga. see PANAMÁ.

Taboo, or TABU, a Polynesian term (probably from *ta*, 'to mark,' and *pu*, expressing intensity) that has supplied a useful verb to the English tongue. The origin of the notion is based on a fundamental religious conception of animistic religion about the natural relations between the gods and certain physical things; it means properly 'sacred,' 'consecrated,' but by a natural transference of meaning by association of ideas has also become equivalent to 'accused,' 'unholy.' The idea of a thing being sacred involves a sense of prohibition, just as a temple or church may be a sanctuary where the safety of a fugitive is respected. And such restrictions enforced by the dread of supernatural penalties become rules of conduct for the regulation of a man's relations to the divine, and thus lead naturally up to ideas of holiness of more advanced religions. Among the Maoris and Polynesians such prohibitions were included within the signification of the word *tabu*, embracing both traditional rules binding on chiefs and people alike, and special prohibitions imposed like the interdict of a modern court of justice, from time to time. Thus the notion could be utilised as a method of protection to life or property—a rudimentary police system and discipline of character, but based upon spiritual even more than on temporal terrors (cf. Judges, xvii. 2). Some things, as idols, the persons and property of chiefs or priests, were always *tabu*, as well as some kinds of food, as the pork denied to women in Hawaii, the water that might not be brought within the house in the Marquesas Islands. Special taboos might be interdicts laid on a house or a road, or an obligation to abstain from some of the ordinary pleasures of life during the sickness of a chief or the time before a battle or a special religious ceremony. This special consecration of the person before battle seems to be fairly made out also as a Semitic custom, by comparing Deut. xxiii. 9–14 with 1 Sam. xxi. 4–6. Again, taboos varied in intensity—during the stricter none went outside his house save the priests, and no fire was lighted. The usual length was forty days, and the fact was intimated by such marks as a white cloth hung up on the thing tabooed. Again, many things were naturally taboo—women after childbirth or menstruation, the bodies of the dead, the head and hair of a chief, and the like—usages which touch the ceremonial uncleanness of Leviticus and some the distinctive characteristics of Nazarites. Elaborate ceremonies were fixed for the removal of the interdict of taboo, and the penalty for its violation was death, in New Zealand usually indiscriminate spoliation of the property of the offender. In New Zealand also there was a development of the system by which a man could reserve something to himself by a kind of private taboo—a system which would readily lend itself to dishonest ends like the *Corban* by means of which unprincipled New Testament Jews wriggled themselves out of their natural obligations. Anything formally devoted or consecrated to a god is inalienable, and contact with it is forbidden under supernatural penalties. Such a ban is merely a taboo, and we find the full significance of such wide-spread restriction in such passages as 1 Kings, xvi. 34; Deut. vii. 26; Josh. vii.; Job, xv. 28. It is obvious that ecclesiastical Excommunication (q.v.) is itself a form of taboo, as also the infamous 17th-century Letters of Intercommuning issued by the Scottish Privy-council against holding any intercourse with the persons therein named, as well as the too notorious boycotting of later days in Ireland.

It only remains to say that a similar distinction between the ceremoniously clean and unclean will be found in the religious rituals of every primitive people. Holy and unclean things are alike in this, that both lay restrictions on man's use of and contact with them, the former because they pertain to the gods, the latter because they are hateful to the

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gods and therefore not to be tolerated by their worshippers. Uncleanness is treated like a contagion, to be washed or purified away. The prohibitions against eating certain animals are closely parallel to the taboos which totemism lays on the use of sacred animals as food. Certain garments also become taboo by contact with holy places, and the worshipper must put off his ordinary clothes (1 Sam. xix. 24) or put on special garments (cf. Ex. xix. 10, Gen. xxxv. 2). And herein we may find the key to many such wide-spread phenomena as fasts, special abstinences, periods of continence, injunctions against eating special things or naming certain names.

See the works on Polynesia or New Zealand, by Ellis, Turner, Waitz-Gerland (vol. vi.), Shortland; the admirable article by J. G. Frazer in *Ency. Brit.* (vol. xxiii. 1888), and Notes C and D to Prof. Robertson Smith's *Lectures on the Religion of the Semites* (1889).

Tabor, a dome-shaped, oak-clad hill of northern Palestine, 7 miles E. of Nazareth, rising solitarily in the north-eastern part of the plain of Esdraelon to a height of about 1000 feet. In the 2d century it was regarded as the Mount of Transfiguration, and the ruins of a crusading church on the summit commemorate this event. Tabor is not named in the New Testament.

Tabor, a small drum like a timbrel or tambourine without jingles, usually played with one stick and in combination with a fife.

Taborites. See HUSS, Vol. VI. p. 16.

Tabriz (also spelt *Tabreez*, *Tebris*, and *Tavris*), a great and ancient city of Persia, capital of the province of Azerbijan, 40 miles E. of Lake Urumiah, and on the Aji, which flows south-west into that lake. The interesting ruin, Kabúd Masjid, or 'blue mosque' (dating from 1450), is in part covered with blue tiles beautifully arabesqued. The citadel is a spacious edifice of burned brick, the walls of which have been cracked in many places by earthquakes. Tabriz is the seat of a varied industry, in which leather, silk, and gold and silversmith's work alone are notable; it is also the emporium of an extensive transit trade. The imports have been estimated at £750,000 a year, and the exports at £350,000—but there is much smuggling carried on. The chief imports are cotton fabrics, sugar, woollen cloth, and wines and spirits. The chief exports are drugs and spices, dried fruits, shawls, carpets, and raw silk. The opening of the Russian railway between the Black Sea and the Baltic, and Russian tariff legislation have injured the overland trade by Tabriz. The Anglo-Indian telegraph line passes through the city. Tabriz, the ancient *Tauris*, was the capital of Tiridates III., king of Armenia, in 297 A.D.; and in 791 it was enlarged by Zobaidah, the wife of Harûn-al-Rashid. In 858, 1041, 1721, and 1854 it was devastated by earthquakes, and it has been besieged, taken by Turks, Turcomans, and Persians in succession. Pop. 170,000, very many of them Turks, and 3000 Armenians.

Tacahout, an Arab name for the small gall formed on the Tamarisk tree, and used as one source for obtaining Gallic Acid (q.v.).

Tacamahaca. There is a good deal of confusion in botanic and commercial circles as to the trees which produce this resin, for Elemi (q.v.) and other resins are often confounded with it, most of these being produced in Brazil by different species of Icica. The fragrant bitter resin from Brazil is chiefly yielded by *Icica tacamahaca*, but other species, as *I. heptaphylla*, *I. icicariba*, &c., furnish a similar resin, known locally as 'almaceja,' which is used in medicine and the arts, and burned as incense in the churches. One Tacamahaca, from *Elaphium Jacquinanum*, sells in Mexico at a dollar a pound, and is called Caricarilo in Venezuela. *Calophyllum calaba* yields East Indian tacamahaca, which somewhat resembles species of olibanum, and gives off a similar odour when heated. The Mexican tacamahaca is usually called shell-tacamahaca, but is better known as *Elemi*. *Populus balsamifera* is termed the Tacamahac poplar, but it yields little or no resin, the leaf buds only being used in ointments to prevent rancidity.

Tachylite, a black opaque natural glass, which results from the rapid cooling of molten basalt. It occurs as a thin selvage to dykes and veins of intrusive basalt—the latter having cooled rapidly from contact with the adjacent rocks. In Hawaii it appears as a scoriaceous or a compact crust, 2 inches or less in thickness, upon the basic lavas of that region. Tachylite never forms lava-flows like the acidic glasses (Obsidian). See BASALT.

Tacitus, the historian, is known to us chiefly from autobiographical touches in his own writings and from allusions in Pliny's letters. His full name is matter of doubt—Cornelius Tacitus being his nomen and cognomen; but whether his prænomen was Publius or Gaius can only be conjectured. Born perhaps at Rome (less probably at Terni) under the Emperor Claudius between 52 and 54 A.D., we infer that his family was respectable from his education, his profession, and his marriage. He studied rhetoric in Rome under M. Aper, Julius Secundus, and, likely enough, Quintilian; rose to eminence as a pleader at the Roman bar; and in 77 or 78 married the daughter of Agricola, the conqueror and governor of Britain. To this alliance he doubtless owed the accelerated promotion which, beginning with a quæstorship under Vespasian, made him prætor in 88 A.D. and a member of one of the priestly colleges. Next year he left Rome, probably for Germany, where, doubtless as governor, he must have acquired his knowledge of the features, natural and social, of the country; and he did not return till 93, when he found his father-in-law had recently died. We know him to have been an eye-witness of Domitian's reign of terror, almost blaming himself, as a senator, for complicity in that monster's judicial murders of such exemplary citizens as Helvidius and Senecio, and we have his own testimony as to the blessed change wrought by the accession of Nerva and Trajan. Under the former emperor he became consul suffectus, succeeding the great and good Virginius Rufus, on whom he delivered in the senate a splendid *oraison funèbre*. In 99 A.D., conjointly with the younger Pliny, he prosecuted the political malefactor, Marius Priscus, and the 'characteristic dignity' with which his share of the prosecution was conducted won him the thanks of the senate. After this we lose sight of him, but may assume it as certain that he saw the close of Trajan's reign, if not the opening of Hadrian's. The high reputation he enjoyed in life is attested by the eulogistic mention of him repeatedly made in Pliny's letters, and in the third century the Emperor Tacitus, proud to claim kinship with him, built in his honour a tomb which was still standing in the later decades of the 16th century, when it was destroyed by Pope Pius V. The same emperor also issued an edict by which the works of his namesake were to be copied out ten times yearly for presentation to as many public libraries.

In spite of this multiplication of copies we possess but a moiety of what he wrote. His earliest work, the *Dialogus de Oratoribus*, treats, in conversational form, of the decline of eloquence following on the change for the worse in the education of the Roman youth under the empire. This, published in 76 or 77, was for some time suspected to be from

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another pen, but is now included in every edition of his works. It has reached us entire. Next comes the *Agricola*, the literary character of which it is difficult to define. Quite a library has accumulated on the question whether it is a 'laudatio funebris,' or an 'apologia' written to shield the memory of Agricola from the charge of servility, or a historical panegyric framed for political ends. As biography it has grave defects, while it cannot be brought under any of the three above-named heads without serious deductions. But it will always be read for its elevation of style, its dramatic force, its invective and its pathos. For English readers its interest is unique. The third work, the *Germania*, or *De situ, moribus, et populis Germaniæ*, is a monograph of the greatest value on the ethnography of Germany. Faulty in geographical detail, it becomes characteristically strong wherever human interest emerges. Fourth in order are the *Historiæ*, or the history of the empire from the accession of Galba in 69 A.D. to the assassination of Domitian in 97. Of the twelve books originally composing it only the first four and a fragment of the fifth are extant. Tacitus is at his strongest in this narrative. His material was drawn from contemporary experience; and though the imperial archives were closed to him, he had at command the personal information open to a man of his position, to say nothing of correspondence (as of Pliny), the 'laudationes funebres,' the 'acta diurna' (what we should call the 'gazette'), and the 'acta Senatus,' the Roman equivalent for Hansard. He had no sympathy with the empire, as indeed we gather from his earliest work. He yearned for the return of an aristocratic oligarchy—the Rome of the Scipios and the Fabii. He is, on this account, a partisan, but is able to justify the most trenchant contrasts between the greatness of Republican and the deterioration of Imperial Rome, which latter he contrasts disadvantageously with the freedom and simplicity of even barbarian Germany. To his peculiar satirical gift which often makes him a 'Juvenal in prose' he gives free rein from time to time; though even in his bitterest moods he never forgets he is a Roman—a certain *chauvinism* betraying itself in his tendency to minimise the defeats of his compatriots and even the number of their slain. He had no appreciation of the higher qualities of the Jews, and his attitude to the growth of Christianity is that of a prejudiced, if cultured Roman, who, recognising an overruling providence or supreme 'Necessitas,' will not stoop to weigh the evidence to which the new religion appealed. The qualities conspicuous in the *Historiæ* are maintained in his last work, the so-called *Annales*, a history of the Julian line from Tiberius to Nero (14 A.D. to 68). Of their sixteen books only eight have come down to us entire, four are fragmentary, and the others lost. In these, as in all his writings, his avowed aim was a noble one, to perpetuate virtue, and to stigmatise baseness whether in word or deed. It is for its direct encouragement of the latter and persecution of the former that he constitutes himself so severe a censor of the imperial system; though he is not blind to the shortcomings of the later republic, under which the provinces, he admits, were worse off than under the empire. Among the more obvious defects which lower his value as a historian are his weakness in geography and his carelessness as to strategic details: he is, as Mommsen calls him, 'the most unmilitary of authors,' though Sallust or Livy run him hard. His style is the most strongly marked of antiquity—statuesque in outline, rich if somewhat too sombre in colouring, effective in antithesis, not seldom obscure from sheer condensation. But the more trouble the reader takes with it the greater his reward.

Editions: Orelli; Ritter; but best of all for the text, Halm; and for the interpretation, Nipperdey and Heräus. English editions are, of the *Annals*, by Frost, but especially that by Furneaux (2 vols. Oxford, 1883–91); of the *Histories*, by Spooner (1891). The French edition of the *Annales* by Jacob is also well worth consulting. Of translations the best are still the Italian by Davanzati and Valeriani; the French Louandre and the German Roth are meritorious; still more so the English one of Church and Brodribb. See also Gerber and Greef, *Lexicon Taciteum* (part. i.–viii. 1877–90); Dräger, *Ueber Syntax des Tacitus* (new ed. 1882); and the short studies by W. B. Donne (1873), and Church and Brodribb (1881).

Tack, a Scots law-term for Lease (q.v.).

Tacna, a southern province of Peru taken possession of by Chili for ten years in 1883 (see PERU, p. 82). Area, 8685 sq. m.; pop. (1891, estimate) 30,998. The coast is steep, the interior lofty, and mostly desert plateaus; but sheep and alpacas are reared, and copper, gold, and silver mined. The capital, Tacna, 38 miles by rail N. of Arica (q.v.), has a pop. of 14,000.

Tacoma, the second city of Washington state, stands on the east side of Puget Sound, by rail 145 miles N. of Portland, Oregon, and 18 S. by W. of Seattle. In 1880 Tacoma was a village with only 1098 inhabitants; in 1890 it was a flourishing city, with trams, cabs, water, gas, and the electric light, miles of wide streets, large wholesale stores, numerous mills and factories, and a busy port. In the district around are coal, iron, precious metals, lumber, farms of wheat, hops, fruit, and vegetables; it has extensive railroad connections, and a trade direct with Japan, forwarding tea to the eastern states by rail. Yet there are traces of the earlier condition of the locality, in the forest close at hand, and in the numbers of Indians seen in the streets from the reservation across the bay. Pop. (1890) 36,006. Behind the city an open valley runs towards where the beautiful Mount Tacoma (or Rainier) rises, from a ridge of snow-covered mountains, to a height of 14,444 feet.

Taconic System, a term applied by Professor Emmons to certain azoic and palæozoic rocks occurring in the state of New York and adjoining districts. These he believed to be the equivalents of the Cambrian rocks of England. Subsequent investigations have shown that Emmons misread the geological structure of the regions studied by him, and his arrangement of the strata has therefore been set aside. The subject has given rise to much discussion amongst American geologists.

Tactics, MILITARY, the science which enables one of two opposing bodies of troops to be stronger than the other at every crisis of an engagement. This may be due to superior numbers, favourable ground, better arms, a higher state of discipline and training, or anything else that, if used to the best advantage, will produce greater strength at the point where and time when it is most essential.

Strategy (q.v.), which has precisely the same objects, merges into tactics as the enemy comes within striking distance, and the latter science is therefore sometimes defined as the strategy of the battlefield. Modern writers use different terms for the various branches of tactical science: *grand tactics* and *manœuvre tactics*, for the marshalling of large masses (30,000 and upwards) of men on the battlefield; *minor tactics*, for the conduct of small bodies, such as advanced and rear guards, outposts, patrols, &c.; *fighting tactics*, for the combat whatever the numbers of the force; *fire tactics*, for the best use of guns and rifles, the massing of their fire, and the selection of the target; and the special *tactics of cavalry, artillery, or infantry, combined tactics, siege tactics*, and *mining tactics*.

It would be impossible to enumerate all the

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schemes and devices which go to make up this science, varying as they must with the arms in use and the manœuvring power of the troops employed, but some illustrations may be given from ancient and modern history. In Judges xx. we read of a favourite and dangerous manœuvre, the Israelites feigning to retreat before the Benjamites, so as to draw them on until their flanks and rear were exposed to the 'liers in wait.' Hannibal at Cannæ and William the Conqueror at Hastings were among the many successful imitators of these tactics. Others, like the Duke of Burgundy in 1476 at Granson, lost their armies through attempting it with unsteady troops. Frederick the Great owed his victory at Mollwitz to the rapid fire and steady discipline of his men, and the former was chiefly due to the introduction of iron ramrods. His later battles give us good examples of manœuvre tactics. At Leuthen he engaged the Austrians, immovable in their chosen position, with his advanced guard, while his main body, under cover of some hills and foggy weather, marched in open column of companies round their flank, wheeled into line, and rolled up their army. At Rossbach he showed how to defeat this manœuvre when the enemy put it in practice. Sending his cavalry and artillery to check the head of their marching columns, he threw his main body upon their flank and inflicted a crushing defeat. At Kolin his *linear tactics* failed because the rear of his column wheeled into line too soon, leaving the head to continue the march, so creating a wide gap in the line when formed up. At Waterloo Napoleon showed an example of *combined tactics* on a large scale. By cavalry charges he obliged the British infantry to form squares, which then became targets for his massed artillery. When under stress of this 'hard pounding' they opened out into line, a renewed charge of cavalry obliged them to take the denser formation again. At Gravelotte the German armies (some 240,000 men) showed an unparalleled instance of *grand tactics* by marching to their positions across country in seven large masses, each consisting of one complete army corps. The *minor tactics* employed by advanced or rear guards and outposts are to a certain extent stereotyped. Their object is to prevent the main body—in the first case a column, often several miles long; in the second a large camp, cantonment, or bivouac—from being attacked before it can get into fighting order. Therefore a series of small parties of two to six men lead the way, or stand sentry, some four miles in front of the main body, while larger bodies support them at a little distance, followed in their turn by still larger units, so that the enemy meets with an ever-increasing resistance until he finds himself confronted by the main body drawn up in a carefully chosen position. *Fighting tactics* must depend chiefly upon the arms in use. The mail-clad horsemen of the 15th century never succeeded in defeating the solid phalanx of pikemen opposed to them by the Swiss Confederation until the employment of artillery prevented the latter retaining such a massive formation. The English archer, protected in front by palisades and on the flanks by spearmen, destroyed the chivalry of France at Cressy and Poitiers, but at Bannockburn was ridden down by the Scottish cavalry, because the flanking spearmen had been omitted. Gustavus Adolphus, by employing cartridges, enabled his infantry to fire more quickly than his opponent and so to form on a wider front. The invention of the bayonet, doing away with the necessity for pikemen to protect the musketeers, still further increased the fire-power of infantry. The British two-deep line overthrew, by its enveloping fire and charge, the column formation of the French in the Peninsula and of the Russians at the Alma, though in this battle its defects are shown in the confusion caused by moving to the attack over broken ground. In the battles of the Franco-German war of 1870–71 it was found impossible to advance against the fire of modern breech-loading rifles except by rushes of comparatively thin lines of skirmishers, constantly reinforced by supports and reserves in rear. The magazine rifle and smokeless powder of to-day still further complicate the problem, presented to the assailant, of how to get to within 500 yards of the enemy without being destroyed. No rules can be laid down except that the attacker's first line must move in three portions, skirmishers, supports, and reserves, followed by a second line to assist in the assault, and a third to complete the success or cover a retreat.

In warfare against savages large numbers, fanatical courage, and rapid movements have to be met by special tactics. Thus the crescent-shaped enveloping attack of the Zulus and the rapid attacks of the Soudanese Arabs were received in the impenetrable square formation or by forming 'laagers:' a reproduction of the wagon tactics by which the Hussites of Bohemia defeated the German cavalry in the 15th century, opposing a material obstacle to the onslaught of an enemy unprovided with artillery.

Cavalry tactics, apart from the exceptional use of dismounted men, are much the same as in the time of the Byzantine empire. Cavalry fight by shock action only, and the power of man and horse has not altered. The Byzantine *Turma*, like the British cavalry brigade, attacked in two lines, with a reserve, flanking parties, and reconnoitring groups, manœuvring in column and attacking in line. *Artillery tactics* consist in massing the fire of every gun as soon as possible upon important points, and overwhelming the enemy's guns and infantry with projectiles at ranges of two miles or more, not shunning closer quarters if the necessity arises.

Siege tactics belong to fortification, but follow the same general course as other combined tactics. Thus in defence the guns oblige early deployment and co-operate with the infantry in repelling the advance, while in the attack they destroy the material defences and keep down the fire of the place so as to enable the assault to be delivered. During the siege *mining tactics* (see MINES, MILITARY) will be made use of on both sides. The functions of the cavalry are first to try to drive off the enemy's cavalry and effect reconnaissances on both sides; then on the attacker's side to complete the investment, and afterwards secure the besieging troops against surprise.

Tactics, NAVAL, may be defined as the art of manœuvring ships and fleets for the purposes of battle. Naval strategy, on the other hand, is the science of combining and employing fleets or single ships in order to carry out defined operations at sea or against an enemy's coast, for obtaining command of the sea or certain portions of it. Although fleets had existed and battles at sea been fought from the earliest periods, it was not until towards the close of the 16th century, in the reign of Queen Elizabeth, that naval war began to assume definite form. The discovery of the New World and the occupation of its richest territories by Spain, the opening up of the route to the East Indies by the Cape of Good Hope, and the efforts which English merchants began to make at this time to push their own trade gave a marvellous impetus to the sea-borne commerce of the world, which carried with it as a necessary consequence the building of larger and more seaworthy ships than had previously existed. War at sea at this time does not appear to have been carried on on any definite plan, and consisted principally, if we

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except the attempt of the Great Armada, of raids on the enemy's commerce and coast-towns. According to Admiral Colomb, in his excellent work on *Naval Warfare*, the first organised attempts to obtain command of the sea as a distinct aim of the operations carried on are to be found in the three wars between the Dutch and English of 1652, 1665, and 1672. Both parties made desperate attempts to destroy the trade of the other, but in the second war Holland, considering the command of the sea the more important object, temporarily gave up her commerce, Dutch merchant-ships being forbidden to put to sea. The net result of the three wars was to leave the honours pretty evenly divided between the two combatants. Several efforts were made by the French, between 1690 and their crushing defeat at Trafalgar, to obtain the command of the sea in order to effect the invasion of England. The first of these attempts, affording one of the best examples of the value of a thorough grasp of strategical principles, was foiled by the Earl of Torrington. An experienced seaman and profound strategist, the earl was forced against his better judgment, by direct orders from the queen and council, to attack the vastly superior forces under Tourville, and accordingly he gave battle (30th June 1690) off Beachy Head. He was defeated, but skilfully drew off and fell back under shelter of the Gunfleet Shoals at the mouth of the Thames. Here, although 'beaten, inferior, and shut up behind sandbanks,' yet from the strategic position it now held this fleet still remained such a 'power in observation' as to paralyse the action of the victorious and superior force; and the French admiral, after some ineffective attempts at landing, returned to Brest. During the Napoleonic wars, the English fleets having more or less complete command of the sea, the strategy of the commanders seems to have resolved itself into blockade of the enemy where possible, or a close observation of his movements with a view to prevent any junction of his scattered forces; and if he ventured to put to sea, into efforts to bring him to action as soon as possible. Steam may be said to have revolutionised naval strategy and tactics; whereas the best-laid schemes were often frustrated by foul winds and gales, now the great steam-power of battle-ships and cruisers renders them independent of wind and to a great extent of bad weather. As a set-off, however, to this, the coal endurance of ships and the replenishing of their supplies of fuel become important factors in deciding upon their movements. The two principal objects of Great Britain's naval strategy must be the command of the Channel with the seas round her coasts, and the protection of the great trade routes. For this purpose a fleet of battle-ships strong enough to meet any hostile combination, supplemented by a proportionate number of fast cruisers, is indispensable. Neglect to provide an adequate number of both classes of ships would almost certainly land the country in disaster; a deficiency in battle-ships might cause her to lose command of the seas round the coast, and would endanger her very existence as a nation; while a poverty of cruisers would mean a sweeping of the country's trade from the sea—such as happened to the United States during the last great civil war—and deprival of breadstuffs and most of the raw materials required for her manufactures. Eighty per cent. of the sea-borne trade of the world is carried in English bottoms, and a few hostile cruisers, if not immediately hunted down, would in a short time work incalculable havoc, as was proved by the operations of the *Alabama* (q.v.) and other Confederate cruisers. On the question whether blockade is any longer possible the opinions of experts are divided; but the majority hold that blockade has become impossible, or is attended with so many risks as to make it highly inexpedient. The experience gained during the civil war in America and the naval manœuvres of late years would seem to show that a perfectly effective blockade is out of the question; on dark nights or in thick weather vessels will almost certainly be able to slip out unobserved, and the danger of attacks from torpedo boats will prevent the blockading squadron from keeping very close in land. The blockading ships must always have their steam ready for full speed; this entails a large consumption of fuel, and after a few days tubes and fires require cleaning. If this is not done a great falling off of speed is the result; in addition to which allowance must always be made for the absence of ships which are recoaling and readjusting their machinery. The ships blockaded labour under no such disadvantages, and have only to choose their own time for breaking out. Observation of the enemy's ports will therefore probably take the place of blockading; this being carried out by a chain of swift cruisers in touch with the main body of the fleet. The distance at which the main body should remain from the enemy's ports, and whether it should keep the sea or lie at anchor at some favourable base, are questions which the practical experience of war alone can solve. One important factor in favour of Great Britain in a naval war lies in the fact that she holds all the important Coaling Stations (q.v.), now all efficiently fortified.

A more or less formal tactical system in naval battles has existed from a very early period. The triremes or galleys of the ancients were armed with formidable iron or brass beaks; propelled by oars they were formed for attack with their bows pointing to the enemy, the aim being to destroy by an oblique blow the oars on one side of the enemy, and then ram and sink her. The earliest great battle in which the superior tactics of a numerically inferior fleet inflicted a crushing defeat on a vastly superior force was that of Salamis (480 B.C.), between the Greeks and the Persians. According to Æschylus, the Greeks were drawn up in one line, while the Persians were in three, but so crowded together that the ships had not room to manœuvre properly; the attack of the Greeks was so impetuous that the front line of the Persians was driven back, throwing the other two lines into hopeless disorder.

In the battle of Sluys, fought 24th June 1340, the English fleet completely defeated the French. The secret of tactical success is to throw an overwhelming force, if possible, on some point of the enemy's line, and destroy him in detail. And this appears to have been done by King Edward III., who, according to Professor Laughton, successfully manœuvred to bring his line obliquely across the right wing of the French, and completely crushed it. On the 7th October 1571 was fought the celebrated battle of Lepanto, between a combined Christian fleet under Don John of Austria and the Turks, in which the latter were completely defeated, mainly by the skilful tactical arrangements of Don John. Acting under the advice of Don Garcia de Toledo, he divided his fleet into three squadrons, which were formed in line abreast, with sufficient room between each for manœuvring; in rear was a reserve squadron ready to give assistance where required. The bulk of the two fleets was composed of galleys; but the Venetian admiral had with him six galeasses (see GALLEYS), and before the action commenced these were placed about half a mile in advance of the fleet, two in front of each of the three divisions; the fire of these vessels, owing to their heavy ordnance, effectually broke the shock of the Turkish onset. Taking advantage of their confusion, Don John pierced their centre, and the

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rout of the Turks was complete, although the commanders of both the Turkish wings displayed considerable tactical skill. The Christian left wing was for a time outflanked and placed between two fires, while the Turkish left wing passed through the Christian line, and, but for the reserve squadron by which it was immediately attacked and driven back, might have altered the fate of the day. Lepanto was the last great battle in which galleys took a prominent part. With 'great ships,' dependent on their sails alone, having their guns mounted on the broadside, a new method of organising fleets for battle came into being. It was not, however, until the wars between the Dutch and English of 1652–72 that the tactical formation of a fleet in 'line of battle' was devised. Previous to this, fighting at sea appears to have been carried on in rather an indiscriminate fashion, although from the first the obtaining of the weather-gauge seems to have been recognised as the great aim for which to manœuvre. Sir W. Monson, a distinguished sea-captain of Queen Elizabeth's time, writes: 'For the greatest advantage in a sea-fight is to get the wind of one another; for he that has the wind is out of danger of being boarded, and has the advantage where to board and how to attempt the enemy.' According to Admiral Colomb, the 'line' was first introduced by the Dutch as a means to weaken the power of fireships, and to bring the fleet under better control. The line of battle consisted in a fleet of ships being extended in a straight line either ahead or abreast one ship of another, keeping as close together as weather permitted, so that at all times every ship should be ready to sustain and relieve one another. It was directed that each ship in the line should keep within half-a-cable's length (about 50 fathoms) of one another. It was introduced into the English navy by Sir William Penn. According to Père Hoste, it was the formation taken up by both English and Dutch in the battle of the 29th July 1653, and by the Duke of York in the battle off the Texel in June 1665. But it was dropped again by Albemarle in the battle of June 1666; and, by the way Sir W. Penn speaks of it (see Pepys), it seems clear that there was still controversy as to whether a line was or was not the best formation for a fleet for fighting purposes. So, although the line was established on paper as the fighting formation soon after the outbreak of the first Dutch war, it probably did not get firm hold until the third Dutch war. However, as a recognised order of battle it was embodied in the Duke of York's fighting instructions issued in 1665. These instructions were modified by Admirals Russell and Rooke at the end of the 17th and the very beginning of the 18th century, and Rule XIX. ran: 'If the admiral and his fleet have the wind (or weather-gauge) of the enemy, and they have stretched themselves in a line of battle, the van of the admiral's fleet is to steer with the van of the enemy's, and there to engage him, each ship from van to rear successively.' It was for acting contrary to this rule that Admiral Matthews was tried by court-martial and cashiered after his indecisive action with the French off Toulon on the 22d February 1744. His fault, for which he was condemned, was breaking (or quitting) his own line with the signal for the line of battle still flying; having formed his line, he broke it himself by running down to attack the French and Spanish centre. Admiral Lestock, the second in command, refused to obey. Both were tried, and Lestock was acquitted. These instructions were still in force in 1781, when Admiral Graves fought his action off the Chesapeake on the 5th September. And on the 5th July 1782 Sir Edward Hughes, in the East Indies, tried to engage the French fleet under Suffren according to Rule XIX. when he had the chance, but failed. According to Professor Laughton, they were not issued after that time. Admiral Rodney on the English side and Suffren on the French had shown that it might be better to leave a commander-in-chief free to act as the occasion required. These instructions also made no provision for engaging from the position to leeward. It would seem that the idea in Russell's and Rooke's minds was that the fleet to windward, whichever it was, was to engage. As a matter of fact, the French never engaged in that way, and as a rule utilised the position to windward to avoid action, as in Admiral Keppel's action in 1778, and in Rodney's two actions with Guichen in May 1780. The system of tactics put in practice by Sir George Rodney in his action with the French under the Comte de Grasse on the 12th April 1782 was by a curious coincidence used on the same day by the French admiral Suffren against the English squadron under Sir E. Hughes in the East Indies, the result of which was to free British admirals' hands, leaving it to their discretion how best to attack the enemy. This was simply concentrating the attack on a part of the enemy's fleet instead of dispersing it along the whole; there was nothing new in this or in the manœuvre by which it was effected, which was cutting through the enemy's line.

The honour of having been the first to demonstrate fully the principles on which the manœuvres of an attack against fleets to windward or to leeward depend is generally ascribed to John Clerk (q.v.) of Eldin, who published the first edition of his *Essay on Naval Tactics* in 1782, and it has been asserted that Clerk had in conversation communicated to Sir C. Douglas (Rodney's flag-captain) his whole system of tactics in the year before the action with the Comte de Grasse. This has, however, been disproved by Sir Howard Douglas in his *Memoir on Naval Evolutions*. As a matter of fact, it is well known that the manœuvre of cutting the enemy's line was several times performed by English commanders since the middle of the 17th century. In an action with the Dutch in 1652 Sir George Ayscue is said to have pierced the enemy's line from to leeward; and again in 1665 the Earl of Sandwich cut through the centre of the Dutch line and caused the disorder which ended in its total defeat. Again, in May 1672 Sir J. Jordan having the weather-gauge cut through the Dutch fleet and threw it into confusion. But it was unquestionably Rodney's important victory over the French in 1782 which gave the manœuvre such notoriety. From the account of the circumstances under which on this occasion the French line was broken, it appears that the idea of the manœuvre was at the moment suggested to the admiral by Sir Charles Douglas on perceiving an opening between two of the ships near its centre. The opportunity was seized of passing through: so narrow was the opening that the admiral's ship almost touched the French ships on each side; the ships astern followed him closely, and these kept up a powerful raking fire against the ships in the rear division of the enemy's fleet, which, being driven to leeward as the van of the British passed through, broke up and made sail before the wind to escape. At the battle of the Nile (1798) Nelson doubled on the van of the French line and attacked it on both sides, while the other ships of the line, the whole fleet being at anchor, could afford no assistance; but at Trafalgar, where his brilliant career terminated with a decisive victory, he broke the enemy's line in two places, bearing down upon it in two columns. Many persons even among naval officers have an idea that not only was Nelson no tactician,

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but that he despised tactics altogether; the real truth being that he was certainly the greatest tactician of his day. Before each of his great actions he had thoroughly digested and arranged the best disposition of his forces, having carefully considered every possible position in which the enemy could be found, and he made a point of discussing the different situations with his captains, so that they were all acquainted with his plans and knew what was expected of them. Steam and armour-plating have since revolutionised the conditions under which naval battles must be fought; but with the one exception of the battle of Lissa in 1866, the only action in Europe in which ironclads have been pitted against each other, there has been no naval action which affords fresh data. The Italian fleet, consisting of eleven ironclads, four frigates, and some small vessels, was bombarding Lissa, when on the morning of the 20th July 1866 the Austrian fleet was reported approaching. Persano, the Italian admiral, formed his ironclads in line of battle, standing to the north-east, nearly at right angles to the course on which the Austrians were advancing. Albini, his second in command, receiving no orders, fell back on a sort of general understanding that wooden ships should not unnecessarily engage armoured ships, and, keeping well to the rear, practically took no part in the action. Tegethoff, the Austrian admiral, advanced at full speed; his seven ironclads were formed in a double quarter line (a double oblique line), his flagship, the *Ferdinand Max*, leading and forming the apex of the wedge. Following in the same formation, at a distance of about 1000 yards, came seven wooden ships, an old line-of-battle ship, the *Kaiser*, leading in the wake of the flagship; in rear of these again came seven gun-vessels. Tegethoff's plans had all been made and explained to his captains, and as he approached the enemy he made the signal, 'Ironclads to rush against and sink the enemy.' For some reason at the last moment Persano, whose flag had been flying on board the *Rè d'Italia*, determined to go on board the *Affondatore;* so he stopped for this purpose, and, as the van in the meantime held on their course, a gap was formed in the Italian line through which the Austrians passed, the Italian rear being at the same time attacked by the Austrian wooden ships. Their centre was exposed to the concentrated attack of the seven Austrian ironclads, so that, as the result of Persano's want of skill, with a fleet of twelve ironclads against seven, the actual condition of the fight was that three were opposed to the seven and annihilated by them, one, the *Rè d'Italia*, being rammed and sunk, while another, the *Palestro*, was blown up. Had Persano's subordinates been men of energy, in spite of the disaster to their centre the Italian van and rear would have destroyed the Austrian wooden division. As it was, with the exception of the *Kaiser*, the Austrian ships suffered but little.

It is impossible to forecast what the issue of the next great naval action will be, or what tactics will be employed. All battle-ships are armed with formidable rams, and in the opinion of many officers ramming will be one of the features of future battles; some ships may and probably will be rammed. But on the whole it is doubtful if ramming will be so generally resorted to, as there is always the possibility of the ship ramming being herself disabled by the shock; if she misses her aim, the ship attempting to ram will probably only succeed in putting herself into position for being rammed in turn; and if an enemy's ship is disabled, to sink her will not merely be to cause a wanton loss of life, but will also be to destroy what otherwise might be a valuable prize. It is, however, certain that the ships which can open an effective fire from their secondary batteries first will have an immense advantage; and whatever the formation for attack may be, to obtain the first fire will undoubtedly be one of the objects aimed at. For the rest, the formations of a modern fleet remain pretty much what they were at the beginning of the century. A fleet is organised in two or more divisions, and each division in two subdivisions. The principal formations are single column in line ahead (the old line of battle) and in line abreast, columns of divisions in line ahead and in line abreast, and quarter or bow columns. Some years back a new formation was tried, which for a time found great favour, but has now been given up; it was called the group system, and consisted of forming ships in groups of three; each group then became a tactical unit for manœuvring purposes.

See Paul Hoste, *Traité des Évolutions Navales* (1690); Clerk of Eldin's *Essay on Naval Tactics* (1790); Captain Bainbridge-Hoff, U.S.N., *Modern Naval Tactics* (1885); Professor Laughton, *Studies in Naval History* (1887); Rear-Admiral Ammen, U.S.N., *The Old Navy and the New* (1891); Rear-Admiral P. H. Colomb, *Naval Warfare* (1891).

Tacuarembo, the largest department of Uruguay (q.v.), in the north centre, bounded S. by the Rio Negro, and devoted to stock-raising.

Tadcaster, a market-town in the West Riding of Yorkshire, occupying the site of the Roman *Calcaria*, on the Wharfe, 9 miles SW. of York. At Towton, 2½ miles S., on Palm Sunday, 29th May 1461, the Yorkists gained a great victory. Pop. 3000.

Tadema. See ALMA-TADEMA.

Tadmor. See PALMYRA.

Tadpole. See FROG.

Tael, a money of account in China, is equivalent to a tael weight of pure silver, or to about 1250 of the copper coin known as 'cash.' The value of the Haikwan tael or customs tael is about 4s. 9d. English, varying with the price of silver. In 1890 it was superseded by the new dollar, equal to that of the United States.

Tænia. See TAPEWORM.

Taffety, or TAFFETA (Persian *tâfta*), a term formerly applied to all plain silks simply woven by regular alternations of the warp and weft. Modifications have, however, been introduced, by varying the quality of the warp and weft, and by the substitution of various colours for the single one of the original taffety. It has therefore become a sort of generic term for *Plain Silk*, and even for some combinations of silk, wool, &c.

Tafilet. See MOROCCO.

Taganrog, a seaport of Russia, in the government of Ekaterinoslav, on the north shore of the Sea of Azov, 15 miles W. of the mouth of the Don. The port is shallow, and the harbour unprotected; but there is a large export trade in wheat, as well as linseed, hempseed, skins, wool, butter, and tallow. The imports are mainly wine, machinery, and fruit. There are many handsome public buildings. Founded by Peter the Great in 1698, the town was bombarded during the Crimean war by an Anglo-French fleet. Pop. 56,047.

Taglioni, MARIA, a celebrated *danseuse*, born at Stockholm, 23d April 1804, of Italian parents, her father (Filippo Taglioni, born at Milan, 1777; died 1871) having been successively ballet-master at several opera-houses in different parts of the Continent. Mademoiselle Taglioni made her début in Paris in 1827, where she created a perfect furore, and was at once recognised as the first of ballet-dancers. Her success was equally great at Berlin, London, and other European capitals. She married Count de Voisins in 1832, and retired from the stage

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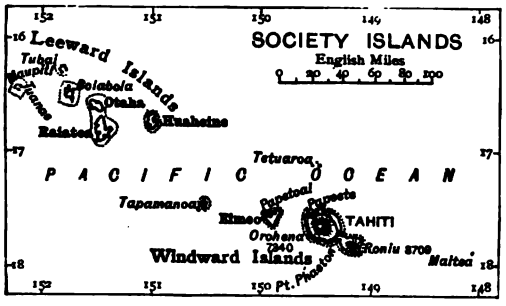
with a fortune, afterwards lost. She died at Marseilles, 23d April 1884. Her brother Paul and her niece were also famous dancers.

Tagus (Span. *Tajo*), the largest river of the Spanish Peninsula, rises on the frontier of the provinces of Guadalajara and Teruel, on the western slopes of the Muela de San Juan. It first flows north-west, then curves to the south-west, and flows mainly in that direction past Aranjuez, Toledo, and Alcantara, and in Portugal, Abrantes, Santarem, and Lisbon, entering the Atlantic about 10 miles lower down. Below Salvaterra it divides into two arms, the western Tejo Novo and the eastern Mar de Pedro, which form a delta, the Lezirias do Tejo. Both fall into the noble Bay of Lisbon, which turns to the west and joins the sea by the Entrada do Tejo. It is navigable to Abrantes, from Santarem for steamers, even ocean-going vessels. Its total length is 566 miles; its drainage area includes 31,700 sq. m.

Tahiti, an island giving name to a small archipelago, also called Society Islands, in the middle of the Pacific, more than 2000 miles NE. of New Zealand and some 3400 SSW. of San Francisco. The islands consist of Tahiti, which embraces 600 sq. m. out of a total of 640 for the entire archipelago, and a number of smaller ones, the chief being Raiatea and Eimeo (q.v.). The group is divided into two clusters, called respectively the Windward



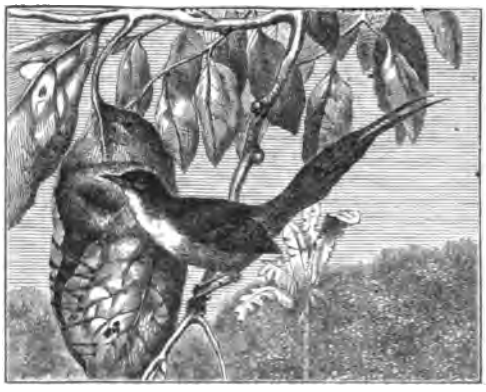
and the Leeward Islands, and stretches for about 200 miles in a north-west and south-east direction. They are composed of volcanic rocks, are mountainous (Orohena on Tahiti is 7340 feet high), and well wooded, with belts of low fertile soil along the shores. Coral-reefs encircle the separate islands, some of which are atolls, and numerous cascades foam down the mountain-sides. The scenery is magnificent, the chief island being often called 'the Garden of the Pacific.' The climate is very moist and hot (range 70° to 84° F.), but equable and healthy. Cocoa-nuts, oranges, vanilla, and all kinds of fruit are grown, as well as some cotton and sugar. Besides these things mother-of-pearl (the most valuable of all), cocoa-nut fibre, and trepang are exported. The imports (tissues, flour, wine, live-stock, sugar, coffee, coal, timber, soap) reached £99,096 in 1889, and £134,144 in 1890. The people cultivate for their own sustenance the bread-fruit, taro, yam, sweet potato, &c. There are several good harbours behind the shelter of the reefs; the most important is Papeete, the capital of the archipelago, which stands on the north-east of Tahiti, and has a Roman Catholic cathedral, an arsenal, and a population (1881) of 3224. The population of all the islands together, though more than half are wholly uninhabited, was 11,178 in 1889. The people, a handsome race of the Polynesian stock, are light-hearted, polite, and gay, but very immoral and untrustworthy; formerly, before they became so thoroughly Europeanised as they are now, they were notorious for their cruelty. The group was discovered by the Spanish navigator De Quiros, but first accurately described in detail by Cook (1769–77). He gave the name of Society Islands in honour of the Royal Society of London on the occasion of his first visit; at that time the population numbered nearly a quarter of a million. The London Missionary Society commenced work in these islands in 1797. But they have had unusual difficulties to contend against, and in 1812 they had to flee for a while to Australia. In 1842 the French forced a protectorate over the eastern (Windward) cluster, though the western division was left to the natives' own governance. In 1880 Tahiti was proclaimed a full French possession.

See Cook's *Voyages;* Desgraz, *Îles Taïti* (1844); Ellis, *Polynesian Researches* (1829); Williams, *Missionary Enterprise in the South Sea Islands* (1839); Pritchard, *Polynesian Reminiscences* (1866); and Dora Hort, *Tahiti: the Garden of the Pacific* (1891).

Tail, and **Tailzie.** See ENTAIL.

Taillandier, SAINT-RENÉ (properly René Gaspard Ernest), a French writer, born at Paris, 16th December 1817, studied at Paris and Heidelberg, and had already filled chairs at Strasburg and Montpellier, when he was called in 1863 to succeed Saint-Marc Girardin at the Sorbonne. He was admitted to the Academy in 1873, and died February 24, 1879. His chief work was to open up the art and literature of Germany to his countrymen in such books as *Histoire de la jeune Allemagne* (1849), *Études sur la Révolution en Allemagne* (1853), *Allemagne et Russie* (1856), and a translation of the Goethe-Schiller letters (1863). He contributed long to the *Revue des Deux Mondes,* and other of his works are *Scot Érigène et la Philosophie scholastique* (1843), *Histoire et Philosophie religieuse* (1860), *Écrivains et Poètes Modernes* (1861), *Drames et Romans de la Vie Littéraire* (1870), and *Études Littéraires* (1881), besides works on the Countess of Albany (1862), Marshal Saxe (1865), Philippe de Ségur (1875), and King Leopold and Queen Victoria (1878).

Tailor-bird (*Orthotomus sutorius* or *Sutoria sutoria*), a bird belonging to the family Sylviidæ. The male is about 6½ inches long; the general colour is olive-greenish; wings brown, edged with green; the two central tail feathers are long. It



Tailor-bird (*Orthotomus sutorius*).

is common in gardens, hedgerows, orchards, and low jungle in India, Burma, and China, being found usually in pairs, but sometimes in small flocks. The name tailor-bird is derived from the way in which the nest is formed. Two or three leaves are stitched together by means of silk from cocoons, thread, wool, or vegetable fibres, the necessary

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holes being made by the bill. In the cup thus formed the nest is made, and consists of cotton-wool with a few horse hairs and some fine grass. The eggs are three or four in number, and are of two distinct types, the ground of the one being reddish white and of the other pale bluish green. The latter type is the rarer, and the two kinds of eggs are never found in the same nest.

Tain (Scand. *Thing*, 'a place of assembly'), an ancient royal burgh of Ross-shire, near the south shore of the Dornoch Firth, 44 miles NNE. of Inverness by the Highland Railway (1864). A ruined chapel marks the birthplace of St Duthac (*c.* 1000–65), whose body was brought back from Armagh in 1253; within it Bruce's queen was taken captive for Edward I., and James IV. did yearly penance here. There are also a collegiate church (1471; restored 1849–82), a court-house (1849), a public hall (1876), and an academy (1812). Pop. (1861) 2319; (1891) 2080, of whom 1632 were in the police and parliamentary burgh, Tain uniting with the four other Wick burghs to return one member. See the Rev. W. Taylor's *History of Tain* (1882).

Taine, HENRI, French critic, so styled first through a whim of the editor of the *Revue des Deux Mondes*, his real name being Hippolyte Adolphe Taine, was born at Vouziers in Ardennes, 21st April 1828. He studied at Paris at the Collége de Bourbon and the École Normale, but his religious opinions barred the way to a scholastic career commensurate with his abilities. He filled minor parts at Toulon, Nevers, Poitiers, but soon threw up the state educational service to return to Paris, where after a short time of struggle he conquered fortune by the sheer strength and originality of his literary work. He took his *Docteur ès Lettres* in 1853, writing for the occasion, besides the regular thesis, a treatise on Lafontaine's *Fables*—a masterpiece of critical analysis which established his reputation. Here at twenty-five he had reached the critical method which was to dominate him throughout life. His method is to make a searching investigation into the race, social conditions, and antecedents of the individual, his environment, the special tendencies of the age and their bearing upon him. These supply the key to the fundamental quality—the *faculté maîtresse*—of the author, which, once grasped, the critical judgment is complete and unassailable. But unfortunately *race*, *period of time*, and *environment* give completely different combinations to the reading of different observers, and with the help of all these it is only possible to see what one wishes or expects to see. The individuality is a subtle essence which eludes all this pretentious analysis, and these vast generalisations remain mere preconceived theories and foregone conclusions, the process the very opposite of the objective, the scientific, the certain. In 1854 Taine won the Academy's prize for an essay on Livy—an audacious application of the same critical method to a period of which he did not possess adequate knowledge. His *Voyage aux Eaux de Pyrénées* (1855) and *Voyage en Italie* (1866) are books that stand almost first of their class. In 1863 Taine was appointed to an examinership at St Cyr; in October 1864 he became professor of Æsthetics and the History of Art at the École des Beaux-Arts in Paris, thus finding a motive for his well-known subtle and paradoxical books on the Philosophy of Art, the Ideal in Art, and the Philosophy of Art in Italy, in Greece, and in the Netherlands. He was elected to Loménie's chair in the French Academy in 1878; he had received the Oxford D.C.L. in 1871. Some of his maturest critical work is to be found in the *Essais de Critique et d'Histoire* (1857) and the *Nouveaux Essais* (1865); his most vigorous polemic in *Les Philosophes Français du XIX. Siècle* (1856), an attack on Cousin, Jouffroy, &c. The *Notes sur l'Angleterre* (1861) is perhaps his best book of its class, spite of its cleverness a warning example of the folly of splendid inductive theories without adequate knowledge. His famous *Histoire de la Littérature Anglaise* (5 vols. 1863–64; Eng. trans. by H. Van Laun, 4 vols. 1872–74) excited a clerical storm in France which cost him the Academy's prize of 4000 francs. The work is marred by sins of omission and commission alike, and by no means justifies its title—Sainte-Beuve suggested as an alternative, 'Histoire de la race et de la civilisation anglaises par la littérature.' But it remains the best work of the kind done by a foreigner, full of sympathetic insight and subtlety, and admirably written. Taine's greatest work, however, is his study of the Revolution, its causes and its issues, *Les Origines de la France Contemporaine* (*L'Ancien Régime*, 1875; the Revolution itself, in three sections, 1878–81–85; *Le Régime Moderne*, vol. i. 1890). As a psychological history of the greatest event in modern history this work stands absolutely alone. The first part is a patient and accurate study of the social state of France for a hundred years, proving the inevitableness of revolution and of its violence alike. Sheer love of truth has carried him through portentous labours in dusty archives, deeds, letters, and memoirs, and the results are set forth with unfailing exactitude and clearness, the only fault being that sometimes the reader feels that breadth of vision has been sacrificed to detail, and that he can scarcely see the wood for the trees. The treatment of the Revolution itself is original, courageous, and creditable in the highest degree to Taine when we consider his liberal antecedents and prepossessions. It constitutes the strongest attack yet made upon the men and the motives of the Revolution, the conclusion being much the same as that reached by Burke in his *Reflections*—to Taine 'a masterpiece and a prophecy,' although to Michelet a 'miserable piece of declamation.' He held before himself a lofty aim, and it must be said that this end he has attained—'J'ai tracé le portrait [of revolutionary France] sans me préoccuper de les débats présents; j'ai écrit comme si j'avais eu pour sujet les révolutions de Florence ou d'Athènes. Ceci est de l'histoire, rien de plus.'

See Leopold Katscher in *Nineteenth Century* for July 1886; and Bourget, *Essais de Psychologie Contemporaine* (vol. i. 1887).

T'âi-P'ings was the name given by foreigners to the followers of Hung Hsiû-ch'wan (S'eiw-tseuen), who raised the standard of rebellion in China in 1851, and whose enterprise was finally suppressed in 1865. Had it proved successful the account of it would have occupied a large space in the history of the country.

The leader Hung was born in 1813 in a poor agricultural village of the district of Hwâ, in Canton province. His only chance of rising in the world being by literary distinction, he became a diligent student, but he never succeeded in taking the first degree at the provincial capital. Through his visits to Canton, however, he had obtained a bundle of Christian tracts, and gained, we must believe, some knowledge of foreign missions. Returning home from another disappointing competition in 1837, he fell into a long illness, in which he saw visions, and conceived the idea of changing the religion of the empire, and subverting the ruling Manchâu dynasty. When he got better he began to disseminate his new views, and could soon boast of two converts. These were like him-

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self teachers of village schools, who by-and-by lost their pupils and came into angry collision with their neighbours. In 1844, in company with the elder of the two converts, Hung went into the adjacent province of Kwang-hsî, where they made many converts, and gathered them into communities which they called 'Churches of God.' Hung began also to give forth arrangements and decrees as revelations communicated to him by 'the Heavenly Father,' and the 'Heavenly Elder Brother.' The Heavenly Father was 'the Great God,' and the Elder Brother was 'our Lord Jesus Christ.' Meanwhile progress of organisation proceeded. A strictly moral conduct and the keeping of the Sabbath were enjoined on the congregations; all idolatrous practices and the use of opium were forbidden; proffers of union from leaders of the Great Triad Society, pledged to the restoration of a native Chinese dynasty, were rejected.

After some years of uncertain struggle with the official authorities, the insurgents (for such they were now) took possession of the district city of Yung-an. There they hailed their leader as emperor of the dynasty of T'âi-P'ing (Grand Peace), and adopted T'ien Kwo (Kingdom of Heaven) as the name of his reign. He was himself also styled T'ien Wang (Heavenly King), and some half a dozen of his oldest and most trusted followers were appointed by him his lieutenants, with the title of Wang (Kings). After being kept for some time in a state of siege in the city by their opponents, on the night of 7th April 1852 they burst forth, scattered their besiegers, and commenced their march to the north. Their number was only a few thousands, and they had no artillery, but full of enthusiasm they pressed on. We can only account for their success by recognising the unpreparedness and supine cowardice of the imperial officers and their troops. They passed from Kwang-hsî into Hû-nan, got command of the river Hsiang, and before the end of the year had reached the great Yang-tsze River. Launching forth on it, and taking on the way the capitals of Hû-pei and An-hûi, they encamped before Nanking on the 8th March 1853. Within ten days it had fallen into their power, and every man of the Manchâu garrison been put to the sword. Their host, grown in the twelve months from under 10,000 probably to more than 100,000, proclaimed the T'âi-P'ing dynasty anew, and swore fealty to the Heavenly King. In a few months a large force was despatched northwards to terminate the contest by the capture of Peking. This expedition did wonders, traversed the two provinces of An-hûi and Ho-nan, then marched west to Shan-shî, from which, turning east again, it penetrated into Chih-lî, and finally occupied an entrenched position only about 20 miles from T'ien-tsin. But the rebellion had there reached the limit of its advance. Though the expedition met with no great defeat, sufficient reinforcements did not reach them, and the leaders were obliged to retreat towards Nanking in 1855.

From this time the rebel cause began to decay. The moral enthusiasm which had distinguished it in Kwang-hsî disappeared. Dissensions arose between the kings, who strove and fought among themselves, and passed from the stage one after another. Hung created new kings to supply their places, but his name had ceased to be a word to conjure with. He secluded himself from public view, and was unable to institute any system of good order or administration in the extensive provinces subject to his control. The promise of Christian institutions died away. The imperial government, moreover, rallied its forces, and a desperate struggle ensued between them and the rebels. Some of the new kings proved to be men of great ability. Sû-châu and Nang-châu, the capitals of Chiang-sû and Chih-chiang, were both reduced and held by them for a time. How the struggle would have ended was still uncertain, when the imperialists began to call in the assistance of foreigners. A body of men of different nationalities entered their service under an American adventurer known to us from his taking this command as General Ward. He was a very capable man, and did the imperialists good service till he was killed in 1862. Then the British authorities at Shanghâi were prevailed on to organise a more effective force, and to put the whole auxiliary movement under the direction of Colonel Charles ('Chinese') Gordon (q.v.). The T'âi-P'ings fought with the courage of despair, but they could not long protract the final issue. Nanking was invested by the imperialists, and taken at last on the 19th July 1864. Hung himself, it is supposed, had taken poison a few weeks before, and so escaped capture. His son, a lad of sixteen years, fled under the protection of two of the kings, but they were all three soon taken and executed. What remnants there were of the fighting men made for the south in different bodies, but they gradually melted away, and were finally extinguished in Canton province in the following year.

See Callery and Yvan, *L'Insurrection en Chine* (Paris, 1853); T. T. Meadows, *The Chinese and their Rebellions* (Lond. 1856); *Pamphlets issued by the Chinese Insurgents at Nanking*, &c., compiled by W. H. Medhurst (Shanghâi, 1853); Andrew Wilson, *Gordon's Chinese Campaign and the Tai-Ping Rebellion* (1868); S. Wells Williams, *The Middle Kingdom* (revised edition, 1883); A. Egmont Hake, *Events of the Taeping Rebellion* (1892).

Tait, ARCHIBALD CAMPBELL, Archbishop of Canterbury, was born at Edinburgh, 22d December 1811, and was educated at the Edinburgh Academy and Glasgow University, whence he passed as a Snell exhibitioner to Balliol College, Oxford. In due time he became fellow and tutor, and was one of the four tutors who in 1841 protested against Newman's Tract 90. In 1842 he was appointed successor to Dr Arnold as head-master of Rugby, in 1849 became Dean of Carlisle (where he lost five little girls at once by scarlet fever), and in 1856 Bishop of London, as successor to Blomfield. Here he did much to bring the teaching of the church home to the people, instituting evening sermons in St Paul's, and encouraging open-air preaching; whilst the 'Bishop of London's Fund' for building schools, churches, and parsonages attained by his efforts to the amount of £350,000. A friend of compromise, though a foe to needless innovations, he showed much tact and personal kindliness in dealing with various controversies as to vestments and confession; condemned the Essays and Reviews, but promoted moderate measures; and though strongly hostile to Colenso's views, intervened to secure him fair-play. The same love of the *via media*, which caused him now to be accused of bigotry and now of indifference, he manifested when (having declined the Archbishopric of York in 1862) he was in 1868 made Primate of all England by Mr Disraeli. He assisted in composing the strifes raised by the question of Irish disestablishment, but was less successful with the Public Worship Regulation Act and the Burials Bill. He took a keen interest in missions, and greatly helped to extend and improve the organisation of the church in the colonies. The Lambeth Conference of 1878 took place under his auspices. He lost in 1878 both his only son, the Rev. Craufurd Tait, and his wife, a daughter of Archdeacon Spooner, whom he had married in 1843; and he himself died 3d December 1882.

See the Life by his son-in-law Bishop Davidson and the Rev. W. Benham (2 vols. 1891), and the Memoir of Catharine and Craufurd Tait by Benham (1879).

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Tait, PETER GUTHRIE, natural philosopher and mathematician, was born at Dalkeith, April 28, 1831. He was educated at the Edinburgh Academy, and, after a year's study in Edinburgh University under Professors Kelland and Forbes, proceeded to St Peter's College, Cambridge. He was senior wrangler and first Smith's prizeman of 1852. In 1854 he was elected professor of Mathematics in Queen's College, Belfast, and in 1860 professor of Natural Philosophy in Edinburgh University. While in Belfast he assisted Dr Andrews in experimental researches into the nature of ozone. Subsequently he was associated with Balfour Stewart in experiments on the heating of a disc rotating in vacuo. His most important experimental work has been on thermo-electricity, on the pressure errors of the *Challenger* thermometers, on the effect of pressure on the maximum density point of water, on thermal conductivity, and on impact. To mathematical physics he has contributed several valuable memoirs, of which those on *Mirage* and on the *Kinetic Theory of Gases* and those involving quaternionic treatment call for special mention. These are all published in the *Transactions* of the Royal Society of Edinburgh, of which Tait has been general secretary since 1879. In pure mathematics his papers on *Knots* and on *Quaternions* are best known. He is recognised as the successor to Hamilton in the development of the calculus of Quaternions (q.v.), his *Elementary Treatise* (3d ed. 1890) being still the best working book for the student. The *Dynamics of a Particle*, by Tait and Steele, originally published in 1856 (6th ed. 1889), still holds its place as a text-book in Cambridge and elsewhere. In conjunction with Sir W. Thomson (q.v.; in 1891 made Lord Kelvin) Tait wrote the well-known *Treatise on Natural Philosophy* (vol. i. 1867; new ed. in two parts, 1879). *The Unseen Universe*, by Stewart and Tait (17th ed. 1890), and *Paradoxical Philosophy* (1878), a sequel to the former, have an interest for other besides scientific minds. Tait also took an important part in the preparation of the biographies of Principal Forbes, Professor Rankine, and Professor Andrews. Of his other writings we may mention *Lectures on some Recent Advances in Physical Science* (3d ed. 1885) and his text-books on *Light* (2d ed. 1889), *Heat* (2d ed. 1891), and *Properties of Matter* (2d ed. 1890). These are written in the forcible style and with the masterly touch which characterise all of his productions. Alike as a lecturer and a writer, Tait has a great power of treating abstruse questions in a simple, direct manner. He has been awarded the Keith and the Victoria Jubilee prizes of the Royal Society of Edinburgh, and one of the royal medals of the Royal Society of London. See *Chronicles of the Cumming Club*, by Lieutenant-Colonel Fergusson (Edin. 1887).

Tai-wan, the capital of the island of Formosa, a large trading city ranking as a treaty port, is on a plain about 3 miles from the south-west coast, with a pop. variously stated at from 30,000 to 120,000. The harbour of Tai-wan at Anping is only a shallow open roadstead. See FORMOSA.

Taj Mahal. See AGRA.

Tajurra Bay, an inlet of the Gulf of Aden into the African coast, south of the strait of Bab-el-Mandeb. On its north shore lies the small town of Tajurra and the French dependency of Obock (q.v.).

Takow. See FORMOSA.

Talavera de la Reina, a picturesque but dirty old town of Spain, in the province of Toledo, beautifully situated on the Tagus, 75 miles SE. of Madrid by rail. It still manufactures pottery, and keeps up its famous fair in August. Here, on July 27–28, 1809, Sir Arthur Wellesley, with 19,000 men and 34,000 useless Spaniards, defeated 50,000 veteran French troops under Joseph Bonaparte and Marshals Jourdan and Victor. Pop. 10,497.

Talbot, a kind of dog deriving its name from the family of Talbot, who had a dog in their coat of arms. The talbot seems to have been the same as that also called the St Hubert's breed, the oldest of the slow-hounds and perhaps the original stock of the Bloodhound (q.v.).

Talbot, a historic English family, traces its descent from Richard de Talbot, named in *Domesday*, whose descendant, Richard, was made a baron (died 1306). The sixth baron, Sir John Talbot, Lord-lieutenant of Ireland, was the famous champion of English arms in France during Henry VI.'s reign, and is familiar to readers of Shakespeare. The hero of some forty victories, he was checked at Orleans by Joan of Arc, and routed and taken prisoner at Patay (1429). Created Earl of Shrewsbury (1442), he fell fighting against France in the eightieth year of his age (1453). The sixth and seventh earls are dealt with at SHEFFIELD. The twelfth earl held prominent office under William III., Anne, and George I., as Lord-lieutenant of Ireland, and Lord High Treasurer and Lord Chamberlain of Great Britain. He was made Duke of Shrewsbury in 1694; but the dukedom died with him (1718). The senior male line of earls died out in 1856, and, after a disputed succession, the title passed to Henry John Chetwynd, third Earl Talbot, who became eighteenth Earl of Shrewsbury, and was the grandfather of the present earl. The Lords Talbot de Malahide are a distinct house, and represent a family settled in Ireland in the days of Henry II.

Talbot, WILLIAM HENRY FOX, celebrated in connection with photography, was born at Lacock Abbey, near Chippenham, on 11th February 1800. He passed from Harrow to Trinity College, Cambridge, where he graduated as twelfth wrangler and obtained the junior Chancellor's Medal in 1821. In the first reformed parliament Talbot sat for Chippenham; but scientific investigation being more to his taste, he gave up politics and devoted himself to the problem of fixing shadows. His principal services to photographic art, which in 1842 secured him a Royal Society medal, are described at PHOTOGRAPHY. Others lay in photographic and 'photoglyphic' engraving. Latterly he devoted himself to the study of general physics and to philological and miscellaneous researches, and was one of the first decipherers of the cuneiform inscriptions from Nineveh. He died at Lacock Abbey, 17th September 1877. His *Pencil of Nature* (1846), one of the first works illustrated by photographs, describes his great invention. Amongst his works are *Hermes, or Classical and Antiquarian Researches* (1838–39); *Legendary Tales* (1830); *Antiquity of the Book of Genesis* (1839); and a work on *English Etymologies* (1846).

Talc, a mineral composed almost entirely of silica and magnesia, in the proportions of 63·5 silica and 31·7 magnesia, with 4·8 water. Its colours are silvery-white, greenish-white, and green. It has a pearly or semi-metallic lustre, and is unctuous to the touch, in which it differs from mica. It cleaves easily into thin flakes which are transparent and flexible, but not elastic. Its hardness = 1, hence it is readily scratched with the finger-nail. It usually occurs compact and not in good crystalline forms, but belongs either to the rhombic or the monoclinic system. It is also found massive, in beds associated with mica-schists, gneiss, and serpentine. Talc frequently occurs in rocks as an alteration-product, especially of magnesia minerals that contain little or no alumina.

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Hence it frequently replaces enstatite, augite, hornblende, &c. It is found in Scotland, Tyrol, the Pyrenees, and various parts of the United States, and is or has been used like Mica (q.v.) for stoves and ovens, for slate-pencils, for surfaces exposed to acids, for stoppers of chemical bottles, &c.—A kind called *Indurated Talc*, or *Talc Slate*, has a curved slaty structure, and is not separable into laminæ like common talc. It approaches in character to steatite, and is used for similar purposes.

Tálchyr Beds, a group of strata occurring at the base of the Gondwána series of India. They probably occupy the same geological horizon as the Permian System of Europe, but owing to the rarity or absence of marine fossils their exact correlation with their European equivalents is somewhat uncertain. The beds are remarkable for the occurrence in them of numerous small and large erratics, some of the latter measuring 15 feet in diameter. In the neighbourhood of the Godavari the included blocks of foreign and transported rocks are smoothed, polished, and striated in the same manner as glaciated stones. Moreover, the hard Vindhyan limestone which underlies this Tálchyr boulder-bed is similarly smoothed and scored in long parallel lines.

Talegalla, or BRUSH TURKEY (*Talegallus*), a genus of Gallinaceous birds, in the same family (Megapodidæ) as the mound-building Megapodes. Of the four species the Australian *Talegallus lathami* is best known. It is a large bird, almost the size of a female turkey, with blackish-brown plumage, pink-red head and neck, and yellow wattle. It inhabits the thickly-wooded parts of

Brush Turkey (*Talegallus lathami*).

New South Wales, and when pursued endeavours to escape by running through the thickest *brush*, or by leaping to the lowest branches of a tree, from which it ascends higher and higher, branch by branch. It thus avoids the dingoes or native dogs, which, however, often hunt it down on open ground. It is easy game to the sportsman, who finds it roosting sleepily under shelter of the branches of trees. The Talegalla is generally seen in small flocks, and they make their nests together, the males heaping up, by means of their feet, mounds of several cartloads of earth and decayed leaves, which are used from year to year, new materials being added annually. The eggs are hatched by the heat of the sun and of the fermenting mound, each egg being separately buried. The parent birds partially uncover them during the day. It is said that nearly a bushel of eggs may sometimes be found in one heap. The flesh of the bird is excellent, and the eggs are also very delicate and eagerly sought after. It is thought that this bird might be added to the list of domestic poultry.

Talent (Gr. *talanton*, from a root 'to balance or weigh') was the heaviest unit of weight among the Greeks. The word is used by Homer to signify indifferently a balance and a definite weight of some monetary currency. Silver coin was first struck in Hellas proper in the island of Ægina, and the Æginetan standard was apparently adapted to the Babylonian gold standard. The Babylonian commercial talent seems to have been either 65 lb. 5 oz. or 66 lb. 5½ oz., and its value in silver from £340 to £400. Derivatives of this (containing 3000 shekels) were in use in Phœnicia and Palestine; but there was another silver talent, and a gold talent worth ⅛ths of the commercial talent. The Euboic talent was of smaller monetary measure and weight than the Æginetan. Its use was mostly confined to Athens, Chalcis, and the Chalcidian colonies; while the Æginetan prevailed over the rest of the Greek world. About the middle of the 6th century B.C. the Attic standard arose, and it is impossible henceforth to distinguish the history of the Euboic from that of the Attic talent. These several talents were similarly subdivided into 60 minæ, the mina into 100 drachmæ, and the drachma into 6 oboli; and their relative proportions are Æginetan talent : Euboic talent : Attic talent :: 39 : 26 : 27, the weight and English money value of the first being 83¾ lb. avoir. and £303, 2s. 6d., of the second 55⅘ lb. and £203, 2s. 6d., and of the third 57¼ lb. and £210, 18s. 9d. Besides the Attic talent there were other talents in use at Athens for weighing various articles. One of these was the Commercial or Emporic, which was identical with the Æginetan standard for coins and corresponded in use to our weight avoirdupois, being the ordinary weight in use in the market.

Talfourd, SIR THOMAS NOON, was born at Doxey, near Stafford, 26th January 1795. The son of a Reading brewer, he was educated at the grammar-school there under Dr Valpy, and in 1821 was called to the bar at the Middle Temple. He became a serjeant-at-law (1833), Whig member for Reading (1835–41 and 1847–49), and a justice of Common Pleas (1849), at the same time being knighted. He died of apoplexy during Stafford assizes, 13th March 1854. Talfourd is remembered by his four nearly forgotten tragedies, of which *Ion* (1835) was brought out by Macready at Covent Garden; by his Copyright Act (q.v.) of 1842; and by his writings on Charles Lamb.

Taliacotius. See RHINOPLASTIC OPERATIONS.

Taliesin. See WALES (*Literature*).

Ta-li-fu, capital of western Yunnan (q.v.).

Talipes. See CLUB-FOOT.

Talisman (through Spanish from Arabic, but thence from the Gr. *telesma*, 'mystery,' 'initiation'), a species of charm, consisting of a figure engraved on metal or stone when two planets are in conjunction, or when a star is at its culminating point, and supposed to exert some protective influence over the wearer of it. The terms Talisman and Amulet (q.v.) are often considered nearly synonymous, but the proper distinctive peculiarity of the former is its astrological character. Talismanic virtues have often been attributed to a peculiarly marked or formed egg, and instances are recorded, by various authors, of eggs hatched with figures of comets or eclipses on them. A species of talisman which has acquired considerable celebrity is the Abraxas (q.v.). Another historic talisman is the Lee-penny, a heart-shaped, dark red jewel, now set in a shilling of Edward I., with a silver chain and ring attached, supposed to have been obtained in Spain by Sir Simon Lockhart, who set

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out with Sir James Douglas to bear Bruce's heart to the Holy Land. So late as 1824 water in which it had been dipped was used to cure cattle bitten by a mad dog. A species of talisman at present in use in Asia is a piece of paper on which the names of the Seven Sleepers and their dog Kitmer are inscribed. Pasted on the walls of houses, it is believed to be a protection against ghosts and demons. Phylacteries (q.v.) were used as talismans; and in Christian Byzantium phylacteries were made bearing the figure of Solomon, the compeller of demons. See ASTROLOGY, DIVINATION, INCANTATION, MAGIC; and Pettigrew's *Medical Superstitions* (1844).

Tallage (from Fr. *tailler*, 'to share or cut out a part'), a name applied to those taxes to which, under the Anglo-Norman kings, the demesne lands of the crown and all royal towns were subject.

Tallahassee, the capital of Florida, 166 miles by rail W. of Jacksonville. It is well planned, and has a state-house, cotton-factory, and pop. (1890) of 2933.

Tallemant des Réaux, GÉDÉON, the Brantôme of his century, was born at La Rochelle about 1619. At nineteen he visited Italy in company with the future Cardinal de Retz, and at an early age married his cousin Elisabeth Rambouillet, daughter of a farmer of revenues, whose ample fortune enabled him to give himself to letters and to society. About 1650 he bought for 115,000 livres the seignorial estate of Plessis-Rideau in Touraine, and was permitted to change its name to that of Des Réaux. He was still living in 1691, but was certainly dead by 1701. His famous work, the *Historiettes*, was written from 1657 to 1659, and is invaluable as a complete picture of the society of his time. The most finished group of these portraits in miniature is that of the famous circle of the Hôtel de Rambouillet. There were many mortifications in that stately and ceremonious age to those sprung from the bourgeoisie, and these without doubt coloured the style and tone of Tallemant. He takes a malignant pleasure in setting forth the vices of the great, but, indeed, his mordant tone is a characteristic note throughout. He shows a relish for a scandalous story, and indeed often outrages the proprieties; but it should be remembered that he wrote only for his own diversion and that of a small group of intimate friends. His short characters, as printed by Monmerqué, are 376 in number, in no case finished biographies, rather collections of illustrative anecdotes, throwing strong light from behind the scenes on the leading figures of three-quarters of a century. And still more, those portraits may generally be accepted as sound and truthful, if some allowance is made for the natural maliciousness and personal prejudices of the writer.—His brother, the Abbé Tallemant (1620–93), was a man of wit and an academician, but his *Vies de Plutarque* (1663) brought him little credit.—His cousin, Paul Tallemant (1642–1712), early began to scribble verses, at eighteen wrote his *Voyage de l'Île d'Amour*, an ingenious commentary on Mdlle. de Scudéry's famous 'Carte de Tendre,' and entered the Academy in 1666.

The *Historiettes* of Tallemant des Réaux were first published, from the MSS. of the author, by MM. Monmerqué, the Marquis de Châteaugiron, and Jules Taschereau (6 vols. 1834). The second and more perfect edition was by Monmerqué alone (10 vols. in 5, 1840).

Talleyrand de Périgord, CHARLES MAURICE, Prince de Bénévent, the most inscrutable and resolutely self-regarding of modern politicians, was born at Paris on 2d February 1754. His father, Charles Daniel, Comte Talleyrand de Périgord (1734–88), was an officer in the army of Louis XV. during the Seven Years' War. An accident early in life, followed by an act of legal injustice, seems to have had a determining influence—for evil and not for good—on Talleyrand's character and career. By this accident he was lamed for life, and, in consequence, his rights of primogeniture were transferred to a younger brother, while he himself was, to his regret, educated not for the army but for the church. He threw himself, however, at the Collége D'Harcourt, at the Séminaire de St Sulpice, and at the Sorbonne, which he subsequently attended in succession, into the work of gratifying his ambition. He made himself a fair scholar, and cultivated the character of a rake and a cynical wit. His promotion, considering his well-known immorality, was rapid. He obtained the abbacy of St Denis in 1775, and five years later he was appointed *agent-général* to the French clergy; finally, Louis XVI. appointed him Bishop of Autun in 1789. Meanwhile he had been watching the signs of the times in France, and carefully studying politics. In 1789 the clergy of his diocese elected him to represent them in the States-general; and on this occasion he delivered a speech which at once stamped him as a political leader. He now became an authority on constitutional, financial, and educational questions, and the friend of men of such widely different gifts as Mirabeau, Sieyès, and Lally-Tollendal. He was one of the members of Assembly who were selected to draw up the Declaration of Right. He took a cynical delight in attacking the profession to which he still nominally belonged. It was he who in 1789 proposed the measure for the confiscation of the landed property of the church. He had rightly calculated that nothing could make him more popular with the rank and file of the revolutionaries in the Assembly; and on the 13th February was elected its president for the usual period. In November he took the oath to the new constitution, and in the beginning of 1791 he consecrated two new bishops—those of Aisne and Finisterre—declaring at the same time his sincere attachment to the holy see. It was now, however, open war between it and Talleyrand. In April he was excommunicated by the pope; he retaliated by giving up the clerical career altogether. About this time he was appointed director of the department of Paris in succession to Mirabeau. His most remarkable achievement, however, as a member of the National Assembly was his preparation of a report upon public instruction. This document was greatly in advance of the times, and was undoubtedly the model followed in all the great changes that subsequently took place, when France reorganised her educational system.

Talleyrand, although a favourite in Paris, had never been in sympathy with the fiercer spirits of the Revolution, and indeed was at heart a believer not in the Republic but in a constitutional monarchy. He was heartily glad, therefore, to leave France for London on an unofficial diplomatic mission early in 1792, and did his best to reconcile Pitt to his country, but failed. In December of the same year his connection with the Revolution was brought to a close by his being placed on the list of *émigrés*. He remained in exile in London till the end of January 1794, when he was compelled to leave under the provisions of the Alien Act. He had made many friends in London, and Lord Lansdowne having given him an introduction to Washington, he sailed for the United States. After the fall of Robespierre the sentence of proscription on him was recalled, and he returned to Paris in 1795. He attached himself to the party of Barras, and in 1797 he was called by the public opinion of the country to the post of foreign minister under the Directory.

Talleyrand was for a time the first man in

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France, Barras being simply his tool. But he had already recognised the genius of Bonaparte, and established intimate relations with him. For a short period, however, he was in disgrace, the fact having been revealed that he had indicated his willingness to sell his services in connection with the conclusion of a treaty between Great Britain and the United States for money. But on the establishment of the Consulate he was restored to his former position as foreign minister, and for many years was closely associated with the fortunes of Napoleon. He had no genuine love for his master, but simply made him a means towards his own aggrandisement and enrichment. Gambling was his chief pleasure, and laid the foundation for an enormous fortune. Among the more odious of the acts of Napoleon with which Talleyrand will always be associated are the kidnapping and murder (March 1804) of the Duc d'Enghien. It is virtually beyond doubt that it was by his instructions that the crime was consummated in spite of the vehement opposition of Josephine, whose opposition led her to denounce him as a *maudit boiteux*. He was greatly instrumental in consolidating the power of Napoleon first (1802) as consul for life and then (1804) as emperor. When in the following year Great Britain, dreading a French invasion, formed a powerful European coalition against France, it was by the ingenuity of Talleyrand that it was partially broken up. To him as much as to Napoleon was owing the organisation in 1806 of the Confederation of the Rhine. Napoleon and he were thoroughly at one as regards the foreign policy of France till the conclusion of the peace of Tilsit in July 1807. After his creation as a prince of the empire under the title of Prince de Bénévent, he withdrew from the Ministry. The failure of Napoleon's designs in Spain was, however, the occasion of the first real rupture between him and Talleyrand.

Although Talleyrand was an advocate of the Austrian marriage, his voice was on the whole for a policy of wisdom during the later years of the first empire. In particular he was opposed to the invasion of Russia; and this gives some justification for his desertion of Napoleon in 1814. That desertion was complete and, from his own point of view, successful. He became the leader of the anti-Napoleonic faction; and through him communications were opened both with the allies and with the Bourbons. He dictated to the Senate the terms of Napoleon's deposition; and he became minister of foreign affairs under Louis XVIII., whom, indeed, he had placed on the throne. In his country's distress Talleyrand was now as much its good genius as was Thiers at a later and even darker period of its history. He negotiated the treaties by which the allies left France in possession of the boundaries which had been established in 1792, and in the congress which met in Vienna in September he successfully vindicated her rights to be heard in the readjustment of European arrangements. He had not calculated on the Hundred Days, however, and offered no help to Louis, who, on Napoleon's escape from Elba, had retired to Ghent. Yet the allied powers insisted on his being taken back into royal favour, and after the second restoration he became prime-minister. He remained in office, though, only for a short time, as he found himself the reverse of a *persona grata* to the king, and disliked by all existing parties in France.

During the reigns of Louis XVIII. and Charles X. Talleyrand was little better than a discontented senator who never lost an opportunity of injuring the court and the government, although it is possible that his protest in 1823 against the Spanish war was animated by genuine regard for his country's interests. During the July revolution he was Louis-Philippe's chief adviser. The citizen king offered him the post of foreign minister, but he declined it. He went to London as ambassador, and was well received there. He reconciled the British ministry and court to France, and returned in triumph to Paris, and finally retired into private life in 1834, and died at Paris on 17th May 1838, at the age of eighty-four.

'A man living in falsehood and on falsehood; yet not what you can call a false man' is Carlyle's view of Talleyrand. 'That rather middling bishop but very eminent knave' is De Quincey's. Both views have been widely entertained; but Talleyrand is a puzzle—more of a puzzle since the publication of his *Memoirs* than he was even before. That he was shamelessly corrupt, immoral, selfish, and mendacious is beyond doubt. Nor was he a wise statesman in the modern sense; the amelioration of human society never entered into his calculations as an object to be aimed at. But he was amazingly clever, infinitely dexterous, and an admirable judge of men. It must also be said for Talleyrand that he separated himself from the latest and most disastrous ambitions of Napoleon, and that in his tortuous diplomacy he generally considered and sought his country's advantage as well as his own.

The Talleyrand *Memoirs*, published in 1891 under the editorship of the Duc de Broglie, and translated into English by Mrs A. Hall (5 vols. 1891–92), are disappointing and by no means reliable, but they must be consulted by any one who wishes to know how Talleyrand himself desired to stand with the world. For his public career the works of Mignet, Bastide, and Louis Blanc, the Lamartine, Guizot, and Rovigo *Memoirs*, Sir Henry Lytton Bulwer's *Historical Characters*, Sainte-Beuve's lectures, and above all Pullain's *Correspondence between Talleyrand and Louis XVIII.* (Eng. trans. 1881) should be consulted. Mere formal biographies, such as Michaud's *Histoire Politique et Privée* (1853) and Pichot's *Souvenirs Intimes sur M. de Talleyrand* (1870), are not to be trusted, as being little better than partisan pamphlets.

Tallien, JEAN LAMBERT, French Revolutionist, was born at Paris in 1769, and was first a lawyer's clerk, next employed in a printing-office, and made himself famous in the first months of 1791 by his Jacobin broad-sheet, *L'Ami des Citoyens*. He was conspicuous in the attack on the Tuileries (10th August), and became secretary to the Commune Insurrectionelle. He had his share in the infamous September massacres, and was elected by Seine-et-Oise to the Convention, where he was one of the most intemperate among the Jacobins, voted for the death of the king, was elected to the Committee of General Security, and played a part in the downfall of the Girondists (June 2). In September he went on his memorable mission to Bordeaux, where he extinguished all opposition under the guillotine, and disgraced himself by shameful profligacy. But a passion for one of his victims, the lovely Comtesse Thérèse de Fontenay (1775–1835), the daughter of the Spanish banker Cabarrus, changed his nature, and earned for her the title of 'our Lady of Pity.' He was recalled to Paris, yet on the 22d March 1794 was chosen president of the Convention. But Robespierre hated his insincerity and immorality, and Tallien, recognising his danger, rallied the trembling enemies of the Dictator with the energy of despair, and headed the successful attack upon him made on the 9th Thermidor. Tallien, now for a moment one of the most influential men in France, lent his aid to suppress the Revolutionary Tribunal and the Jacobin Club, and drew up the accusations against Carrier, Le Bon, and others of the Terrorists; but his importance ended with the Convention, and soon after the frail Thérèse, who had married him in December 1794 and reigned awhile the social queen of Paris, deserted

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him for a wealthy banker. Bonaparte carried him to Egypt, and for some time he edited the official *Décade Égyptienne* at Cairo, but was dismissed by General Menou. On the voyage homeward he was captured by an English cruiser, and brought to England, where the Whig Opposition were stupid enough to make a hero of him (1801). Soon after he returned to France, and was through Fouché and by Talleyrand sent as consul to Alicante. He outlived the empire of Napoleon, and died in poverty, and almost hunger, at Paris, 16th November 1820.

Tallis, THOMAS, 'the father of English cathedral music,' lived in the reigns of Henry VIII., Edward VI., Mary, and Elizabeth. The date of his birth is unknown, but it is believed to have been between 1510 and 1520. His first known appointment was that of organist of Waltham Abbey, which he held till the Abbey was dissolved in 1540, when it is conjectured he became a 'gentleman of the Chapel Royal.' In Day's Psalter, published in 1560, there appear eight tunes composed by Tallis, one of these being still used to Ken's evening hymn. In 1575–76 letters-patent were granted to Tallis and William Byrd (q.v.) according them 'the exclusive privilege of printing music and ruled music paper for twenty-one years.' The first work printed under this patent was issued in 1575, entitled, '*Cantiones quæ ab argumento Sacræ vocantur, quinque et sex partium,*' containing sixteen motets by Tallis and eighteen by Byrd. Tallis died on 23d November 1585, and was buried in the chancel of Greenwich parish church, with an epitaph in verse, which was afterwards set to music by Dr Cooke as a glee. Tallis, besides writing a large number of anthems, pieces, responses, and Te Deums (a complete list of which appears in Grove's *Dictionary of Music*), was the author of a celebrated work—'Song of the Forty Parts,' composed for eight choirs of five voices each. Tallis, it has been well said, was 'one of the greatest contrapuntists of the English school. His works are invested with great learning and much dignity, and are highly calculated to impress by their solemnity and power.'

Tallow. See FATS, OILS, LUBRICANTS, MINERAL TALLOW.

Tallow-tree, the name given to trees of different kinds which produce a thick oil or vegetable tallow, or a somewhat resinous substance, which, like tallow, is capable of being used for making candles. The tallow-tree of Malabar (*Vateria indica*) is a very large tree of the natural order Dipterocarpaceæ. The tallow-tree of China (*Sapium sebiferum* or *Stillingia sebifera*) belongs to the natural order Euphorbiaceæ, but has been naturalised in India, the West Indies, and in some parts of the southern United States. The capsules are internally divided into three cells, each containing a nearly hemispherical seed, which is covered with a beautifully white vegetable tallow. For the manufacture of candles the capsules and seeds are crushed and boiled, and the fat skimmed off whilst in a melted state. To improve the consistency, wax or linseed-oil is added to it. The name tallow-tree is sometimes given in North America to a species of Candleberry (q.v.).

Tally (Fr. *tailler*, 'to cut'), the name given to the notched sticks which, till the beginning of the 19th century, were used in England for keeping accounts in Exchequer, answering the double purpose of receipts and public records. They were well-seasoned rods of hazel or willow, inscribed on one side with notches indicating the sum for which the tally was an acknowledgment, and on two opposite sides with the same sum in Roman characters, along with the name of the payer and the date of the transaction. Different kinds of notches, differing in breadth, stood for a penny, a shilling, a pound, £20, £100, £1000. The tally was cleft through the middle by the deputy-chamberlain with knife and mallet, so that each piece contained one of the written sides, and a half of every notch; and the one half was retained by the payer as his receipt, while the other was preserved in Exchequer. At the union of England and Scotland a store of hazel rods for tallies was sent to Edinburgh, but never made use of. An act of George III. (1783) decreed the discontinuance of tallies in Exchequer, but some use was made of them till 1812; the old tallies were ordered to be destroyed in 1834; and the overheating of the stove within the precincts of the House of Lords in which the tallies were burned caused the conflagration in which the old Houses of Parliament were destroyed.

Tally System is the name given to a mode of dealing by which dealers furnish certain articles on credit to their customers upon an agreement for the payment of the stipulated price by certain weekly or monthly instalments. This system of dealing is carried on chiefly in London and other large towns, in stores or shops known as tally-shops. Both seller and purchaser keep books in which the circumstances of the transaction and the payment of the several instalments are entered, and which serve as a tally and counter-tally. The prices charged under this system are usually exorbitant, and the goods sold, which principally consist of wearing apparel and cheap finery, furniture, hardware, and tea, are generally very inferior in quality. As a general rule, if a married woman in the absence of, and without the knowledge of, her husband, enters into a contract with a tallyman, her husband cannot, on his repudiating the contract, be made liable for the price of the goods unless they are strictly 'necessaries,' or unless he has directly or indirectly sanctioned the purchase.

Talma, FRANÇOIS JOSEPH, an eminent French tragedian, was the son of a dentist, and was born at Paris, 15th January 1763. He made a creditable début in 1787 at the Comédie Française as Séide in *Mahomet*, but the occasion of his first great success was his innovation in costume when playing Proculus in the tragedy of *Brutus*. Previously actors had worn the garb of their own country and even their own time. Talma appeared in a Roman toga. 'Look at Talma,' said a member of the company; 'how ridiculous he is! He has quite the air of an ancient statue!' a compliment as exquisite as it was unintentional. Henceforth Talma, aided by the counsels of the painter David, made a point of rigorous accuracy in costume; and his own remarkably handsome figure, fine voice, and perfect elocution, together with that matchless ease of movement which came after much labour, combined to fit him for the highest tragic rôles. But it was not till 4th November 1789, when he played Charles IX. in Chénier's play, that he rose to his full height in popular estimation. In 1791 he quarrelled with his associates, and with some other dissentients founded the Théâtre Français de la rue de Richelieu—the name changed next year to Théâtre de la République. Here he reigned throughout the Revolution in such characters as Othello; Nero in *Epicharis et Néron;* and Ægisthus in *Agamemnon*. Some of his later characters were among his best; Leicester in *Marie Stuart;* Sylla; Orestes; Leonidas; and Charles VI. Talma died 19th October 1826. See *Mémoires sur Talma*, by Moreau (1826), and his Autobiography, edited by A. Dumas (4 vols. 1849–50).

Talmage, THOMAS DE WITT, pulpit orator, was born at Bound Brook, New Jersey, 7th January 1832, and after holding several charges,

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in 1869 became pastor of an important Presbyterian church in Brooklyn. His sermons are regularly published every week, and translated into many tongues; and a long series of them have been issued in volumes bearing fantastic titles.

Talmud (from Heb. *lamad*, 'to learn;' i.e. '*The* Study') is the name of the fundamental code of the Jewish civil and canonical law, comprising the Mishna and the Gemara, the former as the text, the latter as the commentary and complement. We have spoken under EXEGESIS of the gradual development of this 'Oral' or Post-mosaic Code, and at MISHNA have referred to the older collections upon which the Mishna was framed before being finally redacted in the form in which we now possess it. The oldest codification of Halachoth, or single ordinances, is due to the school of Hillel (q.v.). Simon, son of Gamaliel II. and great-grandson of Gamaliel I., mentioned in the New Testament, and his school carefully sifted the material thus brought together. He died 166 A.D. His son Jehudah Hannasî, commonly called Rabbi, who died 219, and his disciples brought the work to its close in six portions (Sedarim), 63 treatises (Mesichtoth), and 524 chapters (Perakim), which contain the single Mishnas. But besides this authoritatively compiled code there were a number of other law collections, partly anterior to it, and not fully embodied in it, partly arising out of it—as supplements, complements, bylaws, and the like—partly portions of the ancient Midrash, partly either private text-books composed by the masters of the academies for their lectures or enlargements of the existing Mishna. All this additional legal material was collected, not rarely together with the dissensions which begot it, under the name of *Baraitoth*, 'foreign,' 'external,' by Chaiya and his school, in the succeeding generation. Not to be confounded with them, however, are the collections of *Toseftas*, 'supplements,' or *Great Mishnas*, which, commenced at the time of Jehudah Hannasî himself, and continued after his death by his scholar Chaiya and Hoshaiya, embody much of what has been purposely left out in the concise Mishna, which only embraced the final dicta and decisions. Such 'additions' we possess now to 52 treatises, forming together 383 Perakim or chapters. All these different sources of the 'Oral Law'—finally redacted before the end of the 3d century, though probably not committed to writing until 550 A.D.—belong to the period of from about 30 B.C. to about 250 A.D. This great mass of legal matter, although apparently calculated to provide for every case, if not for all times, was yet found insufficient. The dicta of later masters, the decisions of the courts, the discussions on the meaning and purport of special traditions, the attempts at reconciling apparent contradictions in the received material, the amplifications or modifications of certain injunctions rendered necessary by the shifting wants and conditions of the commonwealth—all these and a number of other circumstances made a further codification peremptory.

We must not omit to state here that this Mishna (Mathnisin), although it contained nothing but what were indigenous laws and institutions, was yet not a little influenced—if the very fact of its redaction was not indeed caused—by the spirit of the times. At Berytus, at Alexandria, at Rome the legal schools were then in their most vigorous stage of development, and everywhere system and method were being introduced into what till then had been a vast complex of traditional and popular institutions, decrees, and decisions. The Mishna in all respects fulfilled the conditions reasonably to be demanded from such a text-book as it was intended to form; it was clear, concise, complete, and systematic, and moreover composed in as classical a Hebrew as still could be written in those days of decadence of the 'sacred language.'

The further development of this supplementary, oral, or second law—in fact rather an exegesis thereof—together with the discussions raised by apparent contradictions found in the individual enactments of the Mishnic doctors, is called Gemara—i.e. Discussion, Complement, or, according to another explanation, Doctrine. This Gemara contains, apart from the Halacha, which is generally written in Aramaic, also a vast number of non-legal, chiefly Hebrew, fragments—homiletic matter, tales, legends, and the like—called Haggada.

There are two Talmuds, the one called the Talmud of the Occidentals, or the 'Jerusalem' (Palestine) Talmud, which was closed at Tiberias, and the other the 'Babylonian' Talmud. The first of these now extends over thirty-nine treatises of the Mishna only, although it once existed to the whole of the first five *Sedarim* or portions. It originated in Tiberias in the school of Johanan, who died 279 A.D. Its final redaction probably belongs to the end of the 4th century; but the individual academies and masters through whom it received its completion cannot now be fixed with any degree of certainty. There is less discussion and more precision of expression in this than in the second or Babylonian Talmud, emphatically styled 'our Talmud,' which was not completed until the end of the 5th century, and which makes use of the former. As the real editor of the Babylonian Talmud is to be considered Rabbi Ashe, president of the academy of Sora in Babylonia (375–427 A.D.). Both the Mishna and the Palestine Gemara had, notwithstanding the brief period that had elapsed since their redaction, suffered greatly, partly by corruptions that had crept into their (unwritten) text through faulty traditions, partly through the new decisions arrived at independently in the different younger schools—of which there flourished many in different parts of the Dispersion—and which were at times contradictory to those arrived at under different circumstances in former academies. To put an end to these disputes and the general confusion arising out of them, which threatened to end in sheer chaos, Rabbi Ashe, aided by his disciple and friend Abina or Rabina I. (abbr. from Rab Abina), commenced the cyclopean task of collecting anew the enormous mass of Halachistic material which by that time had grown up. The method he pursued was simple enough. His disciples met twice a year at Sora, in spring and in autumn. At the spring gathering he gave out all the paragraphs of one treatise; and the disciples had the task to find out until the autumn meeting what opinions the different schools had pronounced on the special points thereof. He then investigated the whole critically, and put it into shape according to a certain order. This process took him, with the assistance of ten secretaries, no less than thirty years; and many years were spent by him in the revision of the work, with which he proceeded in the same manner as he had done with the compilation itself. The final close of the work, however, is greatly due to Rab Abina II., head of the Sora academy (473–499). He was the last of the Amoraim expounders, who used merely oral tradition. After them came the Saboraim, the reflecting, examining, critical, the real completers of the Babylonian Talmud, and by many in ancient and modern times declared to have first reduced Mishna and Talmud to writing.

The Babylonian Talmud, as now extant, comprises the Gemara to almost the whole of the 2d, 3d, and 4th Sedarim (portions), further to the first treatise of the first, and to the first of the last

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order. The rest, if it ever existed, seems now lost. The whole work is about four times as large as the Jerusalem one, and its thirty-six treatises, with the commentaries generally added to them in our editions (Rashi and Tosafoth), fill 2947 folio leaves. The language of the Talmud is, as we said, Aramaic (Western and Eastern), closely approaching to Syriac. The minor idiomatic differences between the two are easily accounted for by the different time and place; but the additional matter—quotations and fragments from older Midrash and Gemara collections, Haggada, &c.—is, as before stated, principally written in Hebrew.

The masters of the Mishna (Tannaim) and of the Gemara (Amoraim) were followed by the Saboraim (see above). The code of the oral law had come to a close with the second named; and not its development, but rather its proper study, elucidation, and carrying into practice was the task of the generations of the learned that followed. Apart from this, the Aramaic language itself began to die out as the popular language, and required a further study. The Saboraim no longer dared to contradict, but only opined on the meaning and practicability of certain enactments, and undertook the task of inculcating and popularising the teachings laid down by their sires; apart from bestowing proper care upon the purity of the text itself, and adding some indispensable glosses. Their activity was at its height in the 8th century, when Karaism (see JEWISH SECTS), which utterly denied the authority of the Talmud, sprang into existence. Respecting, however, this authority of the Talmud itself, there has never been anything approaching to a canonicity of the code, or to a reception of it as a binding law-book by the whole nation. The great consideration in which it was always held is owing partly to its intrinsic value, and to the fact of its becoming the basis of all further development of Jewish literature (it being undeniably the most trustworthy receptacle of the traditional Jewish law), and partly to a prosecution against the Jews in the Persian empire at the time of Yezdigerd II., Firuz, and Kobad (439–531), who closed the schools and academies for a space of nearly eighty years, during which this book was the sole authoritative guide of public conscience, and remained endowed with its importance even when the schools were restored. The best commentaries of the Mishna are by Maimonides and Bartenora; of the Babylonian Talmud by Rashi (q.v.) and the Tosafists of France and Germany. An abstract of the Talmud for practical legal purposes by Maimonides (q.v.) is called Mishne Thorah. The Mishna was first printed at Naples, 1492; the Talmud of Jerusalem at Venice, by D. Bomberg, 1523. The Babylonian Talmud was first published at Venice by him in 1520. It is generally printed in twelve folios, the text on the single pages being kept uniform with the previous editions, to facilitate the references. No translation of the Gemara has ever been carried further than a few single treatises. The complete Mishna, on the other hand, has been translated repeatedly into Latin, German, Spanish, &c. by Surenhus, Rabe, Jost, and others. We must refrain in this place from attempting a general characterisation of the Talmud, a work completely *sui generis*, which is assuredly one of the most important records of humanity. Nothing can give even an approximate idea of the immensity of material, historical, geographical, philological, poetical, that lies hidden in its mounds. A contribution to the records of fanaticism may also be found in the 'exoteric' history of the Talmud, which was, albeit utterly unknown save by a few garbled extracts, prohibited, confiscated, burned, and generally prosecuted and inveighed against by emperors, popes, theologians, and fanatics generally, from Justinian down almost to our own day, as perhaps no other book has ever been. In our own times, however, its value begins to be recognised by great scholars, not merely as the only source of the knowledge of Judaism, but as the chief source—next to the gospels—even for the history of the origin and early days of Christianity; a notion long ago hinted at by eminent divines like Lightfoot and others.

See also JEWS, MISHNA, EXEGESIS, and an essay in the *Literary Remains* of Em. Deutsch, original author of the above article. Moïse Schwab has translated the Jerusalem Talmud into French (Paris, 1871; retranslated into English). The Babylonian Talmud has been translated or adapted by J. M. Rabbinowicz in his *Législation Criminelle du Talmud* (Paris, 1871), and *Législation Civile du Talmud* (5 vols. Paris, 1877); Aug. Wünsche, *Der Jer. Thalmud in seinen haggadischen Bestandtheilen ins Deutsch übers.* (Zurich, 1880), and *Der Bab. Thalmud in seinen haggadischen Bestandtheilen* (Leip. 1886); N. Brüll, *Die Entstehungsgeschichte d. Bab. Thalmud*, in *Jahrbücher f. Jüd. Gesch. u. Lit.* ii. (1876); Z. Frankel, *Introductio in Thalmud Hierosol.* (Breslau, 1870); W. Bacher, *Die Agada d. Palæstinensischen Amoräer* (Strasb. 1892); Jastrow, *Dictionary of the Targumim and the Talmud* (Lond. 1887–92).

Talpidæ. See MOLE.

Talus, a term employed in Geology to designate the sloping heap which accumulates at the base of a rock or precipice, from fragments broken off by the weather, or materials in any way carried over it. The term is also applied to the slope of a wall which diminishes in thickness as it rises.

Tamaqua, a borough of Pennsylvania, on the Tamaqua or Little Schuylkill River, 134 miles by rail W. of New York. It has foundries and a shoe-factory. Pop. (1890) 6054.

Tamar, a river which through 45 of its 59 miles is the boundary between Devon and Cornwall; its estuary in Plymouth Sound is called the Hamoaze. See Mrs Bray's *Borders of the Tamar and the Tavy* (new ed. 1879).

Tamarind, a beautiful tree of the natural order Leguminosæ, sub-order Cæsalpineæ, a native of the East Indies, but now very generally cultivated in warm climates. Only one species is known (*Tamarindus indica*), a spreading tree, 30 or 40 feet high, with alternate pinnate leaves, which have from twelve to fifteen pair of small leaflets, and fragrant flowers, with three petals, the pods brown and many-seeded, as thick as a man's finger, and about 6 inches long. There are two varieties, the East Indian and the West Indian, the former having long pods containing from six to twelve seeds, the latter short pods with from one to four seeds. The pods are filled with a pleasant, acidulous, sweet, reddish-black pulp, in which the seeds are imbedded. West Indian tamarinds are usually imported preserved in syrup, the outer shell having been removed. The wood of the

Tamarind (*Tamarindus indica*), branch in flower: *a*, seed-pod section.

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tamarind-tree, and especially of its roots, is a cabinet wood of much beauty, but of extreme hardness, so that it is wrought with difficulty. The pods of some other trees of genera allied to Tamarindus are filled with a similar pulp, which is used in the same way, as the Tamarind Plum of India (*Dialium indicum*), and the Brown and Velvet Tamarinds of Sierra Leone (species of Codarium).

Tamarind pulp contains citric, tartaric, and malic acids, potash, sugar, vegetable jelly, &c. It is refrigerant and gently laxative, and, in combination with more active remedies, is often employed in the diseases of children. A kind of sherbet is also formed from it; and it is an excellent addition to curries. Cold tamarind tea, made by infusing tamarinds in boiling water, forms an agreeable and cooling drink.

Tamarisk (*Tamarix*), a genus of plants of the natural order Tamaricaceæ. This order contains rather more than forty known species, all natives of the warmer parts of Europe and Asia, and of Africa, generally growing in arid situations. Some of them are herbaceous, others are shrubs or small trees, with rod-like branches, scale-like leaves, and small flowers in close spikes or racemes. The Common Tamarisk (*T. gallica*) grows in sandy places in the countries near the Mediterranean, and has been naturalised in some places on the southern coasts of England. It sometimes attains a height of 30 feet. The twigs seem to possess tonic properties, and their medicinal virtues were once in high repute. The ashes of this and some other species of the genus contain much sulphate of soda. The Oriental Tamarisk (*T. orientalis*) is one of the few trees to be seen in the Arabian and African deserts, where its leafless appearance accords with the surrounding desolation. Galls are found on some species in India, and are valued both for medicinal use and for dyeing. *T. mannifera* yields a kind of Manna (q.v.). The German Tamarisk (*Myricaria germanica*), belonging to another genus of this order, is a smaller shrub than the common tamarisk, and abounds in many parts of Europe and Asia.

Common Tamarisk (*Tamarix gallica*):
a, a flower.

Tamatave, a fortified consular port and the chief town of Madagascar, on the east coast, on a bay surrounded with reefs, with a good anchorage. Pop. 4000.

Tamaulipas, the northernmost of the Gulf states of Mexico (q.v.), with part of its low coast bordered by the southern Laguna del Madre. Capital, Victoria (pop. 7800).

Tamboff, the capital of a Russian government, 300 miles SE. of Moscow by rail. Pop. 36,000.

Tambookie-land, part of the Transkei (q.v.) territory.

Tambour (Fr. *tambour*, 'drum'), a frame upon which muslin or other material is stretched for embroidering. Tambour-work was extensively employed for the decoration of large surfaces of muslin, &c., for curtains and similar purposes; but pattern-weaving has been brought to resemble it so closely that it has been largely superseded. See EMBROIDERY.

Tambourine, a very ancient instrument of the drum species, much used by the Biscayan and South Italian peasants at their festivities, and sometimes introduced into orchestral music where the subject of the piece is connected with a people who use it. It is composed of a piece of parchment stretched on the top of a hoop furnished with little bells, and is sounded by the hand, fingers, or elbow. When sharply struck by the hand the tambourine has not much effect, unless used in numbers. When sounded by gliding the fingers along the parchment a roll results, in which the bells are chiefly heard; and by rubbing the parchment without quitting it with the whole weight of the thumb the instrument gives out a wild, grotesque sound which is sometimes of service in masquerade scenes. The tambourine is nowadays much used by negro minstrels and Salvationists, and as a surface for young ladies' paintings.

Tamerlane, whose proper name was TIMUR or TIMUR-I-LENG (i.e. Lame Timur), one of the great conquerors who came forth from the heart of Asia during the middle ages, was born at Kesh (or Sebz), some 50 miles S. of Samarcand, in 1336, his father being the chief of a Mongol clan. Tamerlane's youth and early manhood had been full of adventure, when in 1369, having overcome all his rivals and enemies, he seated himself on the throne of Samarcand. The rest of his life, after he had organised the internal affairs of his kingdom, was spent in military campaigns, inspired by his lust of conquest. He subdued nearly all Persia, Georgia, and the other Caucasian states, and the empire of the Eastern Kipchaks or the Tartars (in 1390). But the military genius of Toktamish, chief of the Eastern Kipchaks and also of the Western Kipchaks or the Golden Horde, imposed upon Tamerlane a second long and determined campaign; but in the end (1395) he effectually humbled his former protégé and broke up his empire. India was the next object of his ambition. He conquered (1398) all the states between the Indus and the lower Ganges, and returned to Samarcand with a fabulous wealth of booty. He next set out to measure himself against the Turks in Asia Minor; but first turned aside to win Damascus and other strong places in Syria from the Mameluke sovereigns of Egypt. At length on the plains of Angora the Mongol and Turkish hosts came together; and, as the result of a gigantic battle, Sultan Bajazet was taken prisoner and his troops utterly routed. The victorious Tamerlane, after resting awhile at Samarcand, turned his eyes towards China, but died whilst on his way to that country, at Otrar, on the eastern side of the Syr-Daria, on 17th February 1405. Tamerlane seems to have been in many respects a typical oriental ruler of the abler class: in times of peace he mingled clemency with justice, and fostered learning and the arts, but in war he was cruel, implacable, and reckless of human life. He is the hero of Marlowe's *Tamburlaine*.

The recognised Life is Petis de la Croix's translation (1722) of one by the Persian writer Sherif ed-Din. See also Sir Henry Howorth, *History of the Mongols* (1876–88), and Sir J. Malcolm, *History of Persia* (1828).

Tamil. See INDIA, Vol. VI. p. 103.

Tammany Society, a Democratic political organisation of New York City, derives its name

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from an Indian chief who is said to have signed the treaty with Penn, and round whom many fanciful legends afterwards gathered. Washington's Pennsylvania troops chose him as their patron saint in place of St George; and on his 'day,' May 12, 1789, the society—although at first as the Columbian Order, to rival the Cincinnati (q.v.)—was founded under a grand sachem and twelve subordinate chiefs of tribes. The organisation soon became a party 'machine,' and by its aid Aaron Burr was raised to the vice-presidency. In 1805 the Tammany Society was formally chartered, its professed objects charity and the extension of the franchise. Its first hall was built in 1811; by 1822 the society had grown too large, and the management and practically all the power were transferred to a general committee of three delegates from each ward. Tammany took a leading part in city politics from the first, and flourished steadily; its new hall was built in 1867–68. Meanwhile the number of the general committee had risen to over 1400, delegates ultimately being sent from each district and precinct; and finally a central 'committee on organisation' was chosen from this unwieldy body, whose chairman was 'boss' of the hall. The most notorious of these 'bosses' was William M. Tweed, whose gigantic frauds, and those of the 'ring' of which he was the chief, were finally exposed in 1871; Tweed was convicted, and died in gaol while suits were pending against him for the recovery by the city of $6,000,000. This catastrophe sadly crippled the power of Tammany, but its influence in politics was by no means killed even then, and it has since, with its leaning towards a protective tariff, proved a constant source of insecurity and danger to the Democratic party at large. Its influence was thrown into the scale against Hancock, successfully, in 1880, and against Cleveland, unsuccessfully, in 1884; and the organisation is still strong enough to carry its candidate for the mayoralty, even against a combination of opposing forces.

Tammerfors, the chief manufacturing city of Finland, 50 miles NW. of Tavastehuus by rail. It is situated on a rapid which connects two lakes, and affords motive-power to cotton, linen, paper, and woollen mills. Pop. (1890) 20,483.

Tammuz. See ASTARTE.

Tampa, capital of Hillsborough county, Florida, at the head of Tampa Bay (nearly 40 miles long), 240 miles by rail SSW. of Jacksonville. It has a lumber trade and a good harbour; and Port Tampa, 9 miles SW. by rail, is the starting-point of steamers for Havana, Mobile, and other ports. Pop. 5532.

Tampico, a seaport of Mexico, in the state of Tamaulipas, on the Panuco, 9 miles from its mouth in the Gulf of Mexico, and about 200 (by rail, *viâ* San Luis Potosi, 637) miles NNE. of Mexico. Harbour-works were undertaken in 1889 to clear a channel, with the help of two jetties thrown out some 5000 feet, over the bar at the river-mouth, and permit ships drawing 24 feet to enter; at the entrance is an iron lighthouse 141 feet high. Situated on a small hill, with flat-roofed white houses and a fine cathedral, Tampico is much healthier than Vera Cruz, whose trade it threatens in time to draw away. Pop. 5000. See *Longman's Magazine*, July 1891.

Tamsui. See FORMOSA.

Tamworth, a town on the border of Stafford and Warwick shires, at the confluence of the Tame and Anker, 110 miles by rail NW. of London, 17½ NNE. of Birmingham, and 7 SE. of Lichfield. Burned by the Danes in 911, and rebuilt by the Princess Ethelfleda, it was the seat of a castle of the Saxon kings, which was afterwards held by the Marmion, Ferrars, and other families, and now belongs to the Marquis of Townshend. That castle, which ranges in date between Saxon and Jacobean times, crowns a knoll 130 feet high; in its noble round keep is a room where Mary Queen of Scots was a prisoner. The church of St Edith, restored since 1870 at a cost of £10,000, has some interesting monuments and a curious double tower-staircase. There are also a bronze statue of Peel (q.v.), the new Jubilee municipal buildings and assembly rooms, a town-hall (1701), a grammar-school (1588; rebuilt 1868), almshouses founded by Thomas Guy (q.v.), a cottage hospital, recreation grounds, &c. The manufactures include elastic, tape, smallwares, paper, &c.; and in the vicinity are market-gardens and coal-pits. A municipal borough, chartered by Elizabeth, Tamworth returned two members until 1885. Pop. (1851) 4059; (1881) 5778; (1891) 6614. See two works by C. F. R. Palmer (1871–75).

Tan, FLOWERS OF. See MYXOMYCETES.

Tana. See THANA.

Tanagers (*Tanagridæ*), a family of the Passeriformes, or perching birds, containing nearly 400 species; the bill is usually conical (sometimes depressed or attenuated), more or less triangular at the base, with the cutting edges not much inflected, and frequently notched near the tip of the upper mandible. This last character will generally serve to distinguish the tanagers from the finches, to which they are very closely allied; while on the other hand they have strong affinities to the American Warblers (Mniotiltidæ). They are mostly birds of small size, the largest barely exceeding a song-thrush, and the smallest, some of the genus Euphonia, being hardly 4 inches in length. This genus, with its ally Chlorophonia, is remarkable in having no gizzard; the birds belonging thereto feed chiefly on ripe fruits, which, with insects, form the principal food of the typical tanagers; some, however, feed on seeds and grain, like the finches. With the exception of a few species which visit North America in summer, the tanagers are confined to Central and South America and the West Indies. Some genera of tanagers are remarkable for their beauty of plumage, which is sometimes confined to the male sex, and sometimes possessed by the female also. Many are also pleasant songsters, such as the Organist Tanager (*Euphonia musica*) of San Domingo; the male of this species has the upper parts purplish-black, the cap blue, and the forehead, rump, and under parts yellow; the female being olive-green, with a blue cap, and lighter and yellowish below. The Scarlet Tanager (*Pyranga rubra*), visiting the eastern parts of North America in summer, and ranging south in winter to Ecuador, Peru, and Bolivia, is also a songster; it is larger than the preceding species, and the male is scarlet, with black wings and tail, while the female is olive, with the wings and tail brown. Tanagers do well in captivity, and several species may usually be seen in the Zoological Gardens.

Tanagra, an ancient city in the extreme east of Bœotia, on the Asopus, which suffered constantly in the wars between Athens and Thebes. Here in 457 B.C. the Spartans defeated the Athenians.

Tanais. See DON.

Tananarivo. See ANTANANARIVO.

Tancred, one of the chiefs of the first crusade, was a son of the Palgrave Otho the Good and Emma, sister of Robert Guiscard, and was born in 1078. He joined his cousin, Bohemund of Tarentum, Guiscard's son, in the first crusade, and specially distinguished himself in the sieges of

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Nicæa, Antioch, and Jerusalem. His reward was the principality of Tiberias. For some time he ruled his cousin's state of Antioch, and shortly before his death, on 21st April 1112, he was invested with the principality of Edessa. Tancred figures in the contemporary chroniclers as the beau-ideal of the crusading chivalry: before Tarsus he quarrelled with Baldwin, brother of Godfrey of Bouillon, but generously made up the quarrel when they came to the Holy City; after the storm of Jerusalem he endeavoured to save some hundreds of the captives from massacre; these and many other noble traits are recorded of him. He is the hero of Tasso's great epic.

Tandy, JAMES NAPPER, Irish patriot, was born in Dublin in 1740, and became a prosperous and popular merchant there. One of the chief Protestant leaders of the popular interest, he took an active part in corporation politics, the free-trade agitation, and especially in volunteering affairs, and became the first secretary to the United Irishmen of Dublin. Early in 1792 he challenged the solicitor-general, Toler, for his abusive language, and was ordered to prison till the close of the session by the House of Commons for breach of privilege. As the viceroy had proclaimed him, with a reward for his apprehension, he had the temerity to raise a formal action for illegality against him and his privy-councillors, which was dismissed at the final hearing on November 26. For distributing in County Louth a 'seditious' pamphlet against the corruption of the powerful Beresford family he was about to be tried at the Dundalk assizes in the spring of 1793, when the government discovered the graver matter that he had met the Defenders at Castle Bellingham in County Louth, and taken their oath, with the view of effecting a coalition between them and the United Irishmen. Tandy fled to America, lived awhile at Wilmington in Delaware, and crossed to France in the spring of 1798, where Madden assures us he was raised to the rank of a general of division in the French army. He followed the ill-fated invasion of Ireland, and made a futile landing at Rutland Island, 16th September 1798, but returned on board that same night. He made his way to Norway, thence to Hamburg, the senate of which handed him over to the English government. On 12th February 1800 he was put on his trial at Dublin, but acquitted. But he was detained in custody, and again put on trial (7th April 1801) at Lifford, in County Donegal, for the treasonable landing on Rutland Island. This time he was convicted and sentenced to death, but, from the same motives of policy that engendered the peace of Amiens (27th March 1801), was permitted to make his way to France. He spent the rest of his days at Bordeaux, dying there in 1803. See Dr R. R. Madden's *United Irishmen* (3d series, vol. i. 1846).

Taney, ROGER BROOKE, American jurist, was born the son of a Maryland planter in 1777, admitted to the bar in 1799, and elected to the state senate in 1816. He was a courageous opponent of slavery as early as 1819. In 1824 he passed from the Federal into the Democratic party, and supported Andrew Jackson, who in 1831 appointed him attorney-general of the United States, and in 1833 secretary of the treasury. He encouraged and carried out the removal of the government deposits from the United States Bank (see JACKSON), and in June 1834 the senate for the first time refused to confirm a president's nomination of one of his cabinet officers. But the balance of parties changed, and in 1836 the senate confirmed his appointment as chief-justice of the United States. His early decisions were strongly in favour of the doctrine of state sovereignty (see STATES' RIGHTS), but his most famous decision was that in the Dred Scott Case (q.v.). He died 12th October 1864. There is a Memoir (autobiographical to 1801) by S. Tyler (1872).

Tanganyika, a lake of Eastern Central Africa, lying between 3° and 9° S. lat., long. of centre being 30° E.; length, 420 miles (nearly a fifth longer than Lake Michigan); breadth, from 15 to 80 miles; depth in some places very great. It was discovered by Speke and Burton in 1858. Livingstone and Stanley disproved in 1871 the theory till then accepted that the lake belonged to the Nile basin. Cameron surveyed the south and west coasts in 1874, and discovered an outlet, the Lukuga, on the west side. In 1876 Stanley satisfied himself that this channel, which he proved to communicate with the Lualaba or Upper Congo, is generally dried up in certain parts of its course, and only carries the overflow of Tanganyika westward at intervals of years. Thomson reaffirmed the connection between Tanganyika and the Congo by the Lukuga. Mr Hore found the height of the surface in March 1879 to be 2700 feet above sea-level; in August 1880 the water had fallen 10 feet 4 inches. Mr Hore believes that the lake had gradually for several years been rising to the former, apparently its highest level, that the obstructions in the Lukuga had then been carried away, and so the water had found its way to the Congo, making the Lukuga a permanent outlet. Except when several rainy seasons follow one another, the evaporation keeps the water about the same level; the evaporation is so great that the opposite shores, even if only 15 miles distant, are visible only in the rainy season. The water is fresh and wholesome, the climate not unhealthy. The lake is surrounded by high mountains, some of them attaining a height of 10,000 feet. The scenery is beautiful, and the shores abound in animals of all kinds. It is 600 miles from the coast; bounds the Congo Free State and the new British sphere on the east, and on the west the German and Portuguese territories; and as a link of connection between the Zambesi basin and the Nile is in a very true sense the heart of Africa. The 'Stevenson Road,' from Tanganyika to Nyassa (see LIVINGSTONIA), lies not far inside the British sphere. See Hore's *Tanganyika* (1892).

Tangent. See TRIGONOMETRY; and for Tangent-sailing, see GREAT CIRCLE SAILING.

Tanghinin is a crystalline body extracted from the kernel of *Tanghinia venenifera* (natural order Apocynaceæ), which grows in Madagascar. It is a deadly poison, acting upon the heart like digitalis, strophanthus, and their allies, but possessing a convulsant action which these lack. Like digitalis it excites vomiting. Tanghin, an extract made by the Malagasy from the kernel, was used by them for the judicial Ordeal (q.v.).

Tangier, or TANGIERS (Arab. *Tanja*), a seaport of Morocco, on a small bay or inlet of the Straits of Gibraltar, 38 miles SW. of the town of that name. It is a small, ill-built town, situated on two hills, the houses—with the exception of the residences of the foreign ministers to the court of Morocco, consuls, and officials—being, as a rule, miserable edifices, and the streets being narrow and dirty. The town is surrounded by old walls, and protected by several forts. It has an extensive shipping trade, though the harbour is a mere roadstead. Tangier was taken by the Portuguese in 1471, and given to Charles II. of England as dowry with Catharine of Braganza. It was held by England till 1683, when, on account of the expense and the badness of the climate, it was evacuated and the fortifications dismantled. The notorious Colonel Kirke (q.v.) commanded the

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garrison, and Bishop Ken was for a short time chaplain. It was subsequently long a nest of pirates. Coal has been found here; and the place is visited by Europeans as a health-resort. Pop. 20,000, mostly Moors and Spanish Jews, with some 400 Europeans.

Tangle, a name given to various kinds of Seaweeds (q.v.), especially to Laminaria.

Tanis (Greek form of Egyptian *T'ân;* Heb. *Zoan*), an ancient Egyptian city in the north-east of the Delta, once the chief commercial city of Egypt, capital of the Hyksos kings about 2100 B.C., and of Rameses II. and other great monarchs of the 19th dynasty. Its prosperity was destroyed by the silting up of the Tanitic mouth of the Nile, which was named from it, and it was destroyed for rebellion in 174 A.D. The ruins near the fishing-village of Sân el Hager near the south shore of the Lake of Menzaleh were examined first by Mariette, and in 1883–84 explored by Flinders Petrie. See the explorer's monograph (1885).

Tanistry, an ancient Celtic mode of tenure, according to which the right of succession lay not with the individual, but with the family, in which it was hereditary; and by the family the holder of office or lands was elected, the design doubtless being that power should in this way be reserved for the strongest or worthiest of the stock—other things being equal, the nearest male relative of the actual tanist in possession. In the case of a monarchy it was the custom to appoint the heir-apparent during the lifetime of the sovereign; and there is no doubt that the nearest to the original stock was held to have a preferable claim, as contended by Bruce in his claim to the Scottish throne.

Tanjore (*Tanjúr* or *Tanjávúr*), a town of India, capital of a district in the Madras province, 180 miles SSW. of Madras city, in the midst of an extensive plain, on one of the branches of the lower Kaveri. The principal edifices of Tanjore are the great temple, described with an illustration at PAGODA, the palace of the old rajahs, and a dismantled fort. Silks, jewellery, carpets, copper vessels, and artistic models in clay, &c. are manufactured. Pop. (1881) 54,745; (1891) 54,060.

Tannahill, ROBERT, poet, was born at Paisley, the son of a hand-loom weaver, on 3d June 1774. From constant study of the poetry of Burns, Fergusson, and Ramsay the ambition was developed in him of emulating these favourite authors; and having been put to the loom after leaving school, he composed many of his best songs to the music of the shuttle. In 1800 he went with a brother to Lancashire, and remained there till 1802, when he returned to Paisley on hearing of his father's failing health. By the year 1805 his poems had become well known in the town, and a number of friends advised him to have them published. In 1807 he issued a volume of 175 pages entitled *Poems and Songs*, of which an edition of 900 copies was sold in a few weeks, to the profit of the author, who was able to deposit twenty pounds in the Union Bank. The poet was now famous, and heard his songs sung everywhere, special favourites being *Gloomy Winter's noo awa*, *Jessie the Flower o' Dunblane*, *The Braes o' Gleniffer*, *Loudon's Bonnie Woods and Braes*, and *The Wood o' Craigielea*. In 1810 the Ettrick Shepherd came to Paisley, and spent a night with Tannahill, who the following day convoyed Hogg half-way to Glasgow. It was a melancholy adieu Tannahill gave him. He grasped his hand, tears gathering in his eyes the while, and said: 'Farewell, we shall never meet again; farewell, I shall never see you more'—prophetic words soon to be verified. He had arranged a corrected edition of his works for the press, and offered them to Mr Constable, who returned the manuscript, as he had more new works on hand than he could undertake. This rebuff the poet was unable to bear, and he sank into despondency; two days before his death he threw into the fire all his new songs, nearly a hundred in number. On 17th May 1810 his body was found in a canal near Paisley; and there seems no reason to doubt that his death was that of the suicide. A granite obelisk marks his grave in the burying-ground of the West Relief (Canal Street) Church; and in 1883 a statue was erected in Paisley as a memorial of the poet. As a song-writer Tannahill continues to be remembered; and several of his pieces have established themselves as part of the musical repertory of the Scottish people. He has a genuine lyrical gift, much tenderness of sentiment, and a true eye and feeling for the simple effects of nature with which he was familiar. Of Burns's force and passion he has little; but in grace and sweetness Burns himself has scarcely surpassed his happier passages. See Life in Semple's edition of his poems (1876), and Brown's *Paisley Poets* (vol. i. 1889).

Tanner, THOMAS, was born at the vicarage of Market Lavington, Wiltshire, January 25, 1674, and after graduating from Queen's College, Oxford, was in 1696 elected a Fellow of All Souls. He had already a high reputation as an antiquary, and Wood at his death in 1695 left him the care of his papers. He took orders, and became in succession chaplain to his father-in-law, Bishop Moore of Norwich, chancellor of Norwich, prebendary of Ely, rector of Thorpe near Norwich, archdeacon of Norwich (1710), canon of Christ Church, Oxford (1723), and Bishop of St Asaph (1732). He was thrice married, and died at Oxford, 14th December 1735. An improved and enlarged edition of his *Notitia Monastica* (1695) appeared in folio under the care of his brother in 1744. But Bishop Tanner's fame rests hardly less securely on his great posthumous biographical and bibliographical work—the labour of forty years, the *Bibliotheca Britannico-Hibernica* (ed. by Dr D. Wilkins, 1748). His edition of Wood's *Athenæ Oxonienses* he had published in 2 vols. folio in 1721.

Tannhäuser, the hero of one of the most beautiful of mediæval German legends, is a knight who, in the course of his travels, comes to the Venusberg, and enters the cave-palace to behold the wonders of the Lady Venus and her court. After having lived there some time in every kind of sensual delight, his conscience smites him, he invokes the Virgin Mary, and makes a pilgrimage to Rome, to Pope Urban, to seek, through confession and penance, remission of his sins, and escape from damnation. But the pope, when he hears his story, tells him that he can as little obtain God's mercy as the rod in his hand can become green again. Thereupon Tannhäuser departs in despair, and returns to the Lady Venus in the mountain. Three days after he had gone the dry rod begins to sprout and bear green leaves; and the pope immediately sends out messengers to every country, but in vain, for the knight can nowhere be found. Such is the story as told in the popular ballad once common all over Germany, and even beyond it. Elsewhere it is added that 'the faithful Eckhart,' of many German heroic legends, sits before the mountain, and warns the people of its dangers. In this shape the story may be traced as far back as the 14th century, but the substance of the legend is much older, and goes back to the days of German paganism. Some traditions connect it with the Hoselberg or Hörselberg, near Eisenach, in which the Lady Hulda (see BERCHTA) held her court, who again suggests

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Freyja the Scandinavian Venus. Grimm sees in the legend a touching portrayal of the regret that lingered in the popular heart for the dying paganism, and of the sternness of the Christian priesthood in regard to it. This idea of subterranean palaces in which the king or queen of dwarfs, pigmies, and fairies held their court seems to be universal. Everywhere stories are told of men, like Thomas of Ercildoune, being enticed to enter, and finding it difficult or altogether impossible ever again to obtain their liberty. The visit of Ulysses to the isle of Calypso, and that of Circe are amplifications of the same idea. In later times the story has been treated by Tieck, and gave the subject for an opera to Wagner.

About the middle of the 13th century, and contemporary with Pope Urban IV. (1261–65), there lived in reality in Germany a Bavarian knight named Tannhäuser, who, as Neidhart relates, after returning from the wars, lived as a minnesinger at the court of the Austrian Duke Frederick II. the Quarrelsome, and after his death either with Duke Otto II. of Bavaria, or wandering from place to place. Tannhäuser composed fine spirited ballads.

For the legend, see Zander, *Die Tannhäusersage und der Minnesänger Tannhäuser* (1858); Grässe, *Der Tannhäuser und ewige Jude* (2d ed. 1861); also a slight paper in Baring-Gould's *Popular Myths of the Middle Ages*.

Tannin, Tannic Acid, or DIGALLIC ACID, is an astringent substance found in gall-nuts, and hence called gallotannic acid. The name tannin has, however, been applied to a number of different astringent compounds existing in the bark or leaves of most trees. These compounds, though not intimately related to each other, yet agree in giving blue or green-black compounds with salts of iron, and in producing leather by their action on animal skins. The true tannic acid is a colourless amorphous body, obtainable in fine scales or vitreous masses by the evaporation of its solution. A yellowish colour soon develops in the acid even when excluded from light. It is readily soluble in water and alcohol, but insoluble in chloroform. It reddens litmus, and has a powerful astringent taste and local action. On this account it is employed for relaxed throats as a gargle, or in the form of lozenge. As a styptic it is of much value. In the arts it is employed in the manufacture of ink, although most makers employ the crude gall-nuts in preference to the purified acid. The various tanning substances containing the other varieties of tannin are more employed in leather-making and Dyeing (q.v.).

Tanning. See LEATHER, BARK.

Tansa, a small river whose valley has been, at a point 65 miles N. of Bombay, impounded by the largest masonry dam in the world, for the water-supply of Bombay. The embankment, a little short of two miles long, is 118 feet high and 100 feet thick at the bottom, and contains over 11,000,000 cubic feet of masonry—all solid stone. The area of the dam is about 8 square miles, and the water-supply is equal to about 100,000,000 gallons per day. The works kept on an average from 9000 to 12,000 workpeople engaged for 5½ years; and the water was turned on by the viceroy, 31st March 1892.

Tansy (*Tanacetum*), a genus of plants of the natural order Compositæ, sub-order Corymbiferæ, allied to Artemisia (see WORMWOOD), and having hemispherical heads of flowers, with the florets all tubular, the receptacle naked, the pappus a slight membranous border. The species are pretty numerous, and are natives of the temperate parts of the Old World. Common Tansy (*T. vulgare*) is a native of Britain and of continental Europe, growing in fields and by roadsides, river-banks, &c. It has long been generally cultivated in gardens. It is now naturalised in many parts of North America. It is a perennial, from 2 to 4 feet high, with great abundance of deep-green, bipinnatifid, inciso-serrate leaves; the flowers in terminal corymbs, yellow, and rather small. The leaves and flowers have a strong aromatic smell and a bitter taste. The young leaves are used for flavouring puddings, cakes, omelets, &c. The plant is also tonic and anthelmintic, and *Tansy tea* is an old popular medicine. Some curious old customs still linger in many parts of England connected with the use of *Tansy cakes* and *Tansy puddings* at Easter, which was originally intended to represent the use of bitter herbs at the Paschal feast.

Tansy (*Tanacetum vulgare*).

Tantallon Castle. See NORTH BERWICK.

Tantalum (sym. Ta, equiv. 182) is a very rare metal, discovered by Hatchett in 1801, and in 1802 by Ekeberg in the Swedish minerals known as tantalite and yttrotantalite. It is so closely allied to columbium or niobium that Wollaston regarded the two metals as identical, a view which was generally adopted till Rose disproved it in 1846. It is of no practical importance. Tantalic acid is Ta_2O_5.

Tantalus, a character noted in Greek mythology for the punishment he suffered in the lower world. He is said to have been the son of Zeus, and some accounts describe him as king of Argos or Corinth. For having divulged the divine counsels of Zeus he was afflicted in the lower world with an insatiable thirst, and had to stand up to the chin in a lake, the waters of which receded whenever he tried to drink of them. Clusters of fruit hung over his head, which eluded his grasp whenever he endeavoured to reach them, his mind at the same time being kept in a state of constant terror lest a huge rock, suspended above his head, and ever threatening to fall, should crush him. Tantalus was the father of Pelops, Broteas, and Niobe.

Tantalus, or WOOD-IBIS, a genus of birds of the stork family (Ciconiidæ), quite distinct from the true ibises. The American Wood-ibis (*T. loculator*) is as large as a stork, but more slender, white, with black quill and tail feathers, the naked skin of the head and neck black. It is especially at home in South America, but also occurs in the southern states in swampy districts, and breeds abundantly in Florida. An allied African form, *Pseudotantalus rhodinopterus*, was for long regarded as the sacred ibis of the Egyptians, but this was a true ibis (*Ibis æthiopica*).

Tantia Topee, the most notable leader under Nana Sahib (q.v.) of the Indian Mutiny, who, in alliance with the Rani of Jhansi, held the field for a time after his chief had fled. He hid in the jungles of Central India till 7th April 1859, when he was captured and executed.

Tantra. See SANSKRIT, Vol. IX. pp. 153–154.

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Tantum Ergo. See PANGE LINGUA.

Tâoism, the religious system founded by Lâo-tsze (q.v.). See also CHINA; Legge's *Texts of Tâoism* (1891); and De Rosny, *Le Taoisme* (1892).

Taormina, a town on the east coast of Sicily, on a lofty rock 900 feet above the sea, 35 miles SW. of Messina by rail. The ancient Tauromenium was founded about 358 B.C.; it has numerous relics of antiquity, as an aqueduct, tesselated pavements, and the remains of a theatre, reckoned one of the most splendid ruins in Sicily, and commanding a view of almost unparalleled magnificence. Pop. 2388.

Tapajos, a navigable river of Brazil, and an affluent of the Amazon, is formed by the confluence of the Arinos and the Jurnena, both of which rise in the south of Matto Grosso state. After a northward course of 900 miles, the Tapajos falls into the Amazon, above the town of Santarem. Steamers run 150 miles to the lowest of several waterfalls. A short portage separates the upper waters of the Tapajos from those of the Paraguay.

Tapestry is an ornamental textile used for the covering of walls and furniture, and for curtains and hangings. In its method of manufacture it is intimately related to oriental carpets, which are made in precisely the same way as certain kinds of tapestry, the only distinction being that carpets are meant for floor-coverings alone. Fine storied tapestries are, however, much more elaborate and costly than any carpets, and they have altogether different artistic pretensions. Tapestries are divided into two classes, according as they are made in high-warp (*haute lisse*) or low-warp (*basse lisse*) looms. The former in manufacture have their warp-threads stretched in a vertical manner with a roller at the top around which the warps are wound, and another at the bottom for receiving the finished tapestry. On the low-warp looms the warp is extended horizontally, there being an arrangement in both for shedding or separating the warp into two leaves, front and back, as in ordinary weaving. It is in high-warp looms that the most elaborate storied or pictorial tapestries are made, low-warp looms being more largely devoted to the production of still-life and non-pictorial decorative compositions. Notwithstanding these differences, it is difficult to distinguish between tapestries which have been made on high and low warp looms respectively, although the latter are more rapidly and consequently less expensively woven. In reproducing a design on the high-warp loom the workman has the portion of the cartoon he is copying behind him. He works from the back or wrong side of the tapestry, and to guide him the outline of the subject is slightly indicated on the warp threads. He has an endless number of shades and tones of wool and silk (formerly gold and silver threads were also used) which, with little shuttles, he shoots through the number of warp threads required for each particular shade, and with such wefts he covers and entirely encloses the warp-threads. In the reproduction of a design the utmost skill and experience are essential, not only to outline the figures and composition generally with accuracy, but also for the proper grading and hatching in of tones to secure the rich and mellow harmonies which constitute the principal charms of a picture. In low-warp tapestry-weaving the design to be copied is placed under the warp, and, as the workman here also weaves from the back, the design is reversed in the finished production. Of late years only it has become the habit to trace a reverse drawing on the warp-threads, whereby the tapestry is made to show the design as originally composed. The difficulty of examining low-warp work as it proceeds prevents the elaborate and delicate work being produced by this method which it is possible to secure on high-warp looms.

The art of tapestry-working is of high antiquity, and it may be that the curtains of the tabernacle 'of blue and purple and scarlet, with cherubim of cunning work' (Exod. xxvi. 1), were a kind of tapestry, though more probably they were of needlework. The so-called Bayeux Tapestry (q.v.) is really embroidered work of the period of William the Conqueror. The art of tapestry-working, and indeed all fine weaving, came to Europe from the East, and so well was this recognised that during the middle ages the fabric was generally known as *Sarrazinois*. So far as is known the art of high-warp tapestry-weaving was first practised in Flanders towards the end of the 12th century, and it flourished in the rich and prosperous towns of Arras, Valenciennes, Lille, Brussels, &c., and from the predominant importance of the first of these towns storied tapestries came to be generally known as 'Arras.' The disasters which overwhelmed the land during the contest with the Spanish power led many of the most skilful of the tapestry-weavers to seek an asylum in foreign lands, and thus the art spread to various European centres. Repeated attempts had been made in France from the middle of the 16th century onwards to establish the industry, but it was not till two Flemish workers, Comans and De la Planche, were engaged for an establishment formerly occupied by a family of wool-dyers called Gobelin (q.v.) that the industry was successfully founded and the famous Gobelins factory begun. From the early part of the 17th century to the present day the Gobelins has continued to be the source of the richest and most artistic of high-warp tapestries anywhere produced, and indeed that establishment may be regarded as the only source of fine storied tapestries of modern times. The manufactures of the Savonnerie, an establishment founded by Henri IV. for velvet-pile carpets and hangings, was in 1826 combined with the Gobelins, and the two industries are now carried on together by the state. There is also a state factory for low-warp tapestries at Beauvais; and at Aubusson and Felletin commercial tapestries are very largely made for furniture covering, &c., in establishments which in earlier times were celebrated for their tapestries *de luxe*. Tapestries were also made at an early period in England, and it is worthy of remark that English wool has always formed the staple for the finer qualities of the fabric. In 1619 an establishment was founded at Mortlake by Sir Francis Crane, and under his skilful guidance works of the very highest merit were produced. Throughout all the troubles of the Great Rebellion period Crane's factory continued in operation, and it was only in 1703 that it was closed. In 1872 some French tapestry-weavers were brought to Windsor, and a factory established there under royal patronage, which survived till 1888.

Tapestries — especially the high-warp storied varieties — are the textiles of kings. In earlier times the monarchs of Europe resorted to the Netherlands for pieces for the decoration of their palaces; and when the manufacture came to be more disseminated it was almost entirely under state supervision and control that the work was carried on. The pieces made were almost exclusively reserved for royal use, and to be given as presents in connection with great state celebrations and functions. The very foremost artists devoted their best energies to the production of designs and full-sized cartoons for the guidance of the weavers; and it was as patterns for tapestry that Raphael produced the immortal series of cartoons illustrating the acts of Christ and the Apostles

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which were executed in Brussels for the Sistine Chapel. Seven of these cartoons, purchased by Charles I. under the advice of Rubens, are now in South Kensington Museum. It is worthy of remark that the earlier artists generally understood the conditions of tapestry design much better than the more recent painters who have supplied cartoons for copying. The cartoons of the early artists were simple in motive and decorative treatment, the masses were bold and broad, and the colour scheme harmonious without complexity. By modern artists the mistake was made of attempting, if not to rival, at least to copy oil-paintings with all their subtle harmonies and minuteness of detail. The mistake is now recognised, and among the regulations of the Gobelins is one that no tapestries will be there produced except from approved copies or cartoons made expressly for that purpose.

See A. de Champeaux, *Tapestry* (1878); Eugène Müntz, *Short History of Tapestry* (Eng. trans. by Sparkes, 1885); A. S. Cole, *Tapestry and Embroidery* (1888); the South Kensington *Descriptive Catalogue* (1888); French works by Guiffrey (1878), Havard (1889), and Gerspach (1892); works on special collections by Darcel (1878-81), Loriquet (1883), and Farabulini (Rome, 1884), and on ancient oriental tapestry by Riegl (Leip. 1890).

Tapeworms, a term sometimes used as a popular synonym for Cestoda or Cestoid Worms (q.v.), but especially for those which belong to the families Tæniadæ and Bothriocephalidæ. In his diagnosis of the Tæniadæ Professor Leuckart notes the following points. The small pear-shaped or spherical 'head' bears, at some distance from the apex, four roundish suckers with powerful musculature. Between these there is usually, near the apex, a simple or manifold circle of claw-like hooks, which are supported and moved by a muscular rostellum. The 'joints' or proglottides are distinctly separated from one another, are usually longer than broad, are almost always provided with marginal generative apertures, and vary in number from three to three or four thousand. These joints are liberated from the host with great regularity, but somewhat late, after the embryos are well developed. 'The uterus has no direct communication with the exterior, so that the eggs remain inside the proglottides, and are only set free when these are destroyed.'

Fig. 1.—Head of *Tænia solium* (Leuckart).

The adult sexual Tæniadæ live for the most part in birds and mammals, the larval 'Bladder-worms' (q.v.) or Cysticerci occur in both higher and lower animals. In this family most zoologists recognise only one genus, Tænia, but there are so many species that Leuckart finds it convenient to recognise several sub-genera.

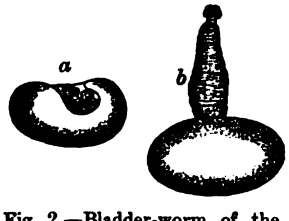

Fig. 2.—Bladder-worm of the Pig (*T. solium*):
a, with invaginated head, about natural size; *b*, with evaginated head, a little bigger than natural size (Leuckart).

In the Bothriocephalidæ the head is oval and flattened; the two suckers, devoid of special musculature, lie opposite one another longitudinally; the hooks, if present at all (Trianophorus), are without a rostellum; the 'joints' are indistinctly separate, always broader than long, and detached in numbers; the uterus has a ventral opening through which the embryos escape; these embryos are usually ciliated and able to swim about in water; the development is more direct than in Tæniadæ, for a true bladder-worm stage seems always wanting. The family includes a few genera—e.g. Archigetes, Ligula, Trianophorus, but the most important practically is Bothriocephalus.

Two Tæniadæ are in their adult sexual state parasitic in man: *Tænia solium*, with the bladder-worm stage in the pig; *T. saginata* or *mediocanellata*, with bladder-worm in the ox; and some others, *T. cucumerina*, *T. nana*, *T. flavomaculata*, and *T. madagascariensis*, occasionally occur. They infest the small intestine, and there also *Bothriocephalus latus* (larval in pike and burbot) may be found. Moreover Tænioid bladder-worms also occur in man, the most important being that of *Tænia echinococcus*, which lives as an adult tapeworm in the dog.

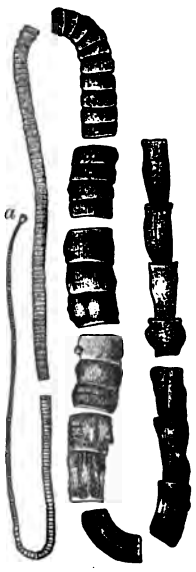

Fig. 3.—Portions of *Tænia mediocanellata*, about half natural size (Leuckart).

In the majority of cases man becomes infected with tapeworms through eating the raw or imperfectly cooked flesh of the animal—be it ox or pig or fish—which is the host of the immature stage of the parasite. In other cases filthy habits of living and eating render it readily possible for the bladder-worms—or, in the case of *T. echinococcus*, the ova—to get mixed up with the food. The presence of tapeworm in the small intestine need not be dangerous—indeed, the Abyssinians regard freedom from the parasite as a disaster; but it is usually troublesome, giving rise to disturbances of digestion, colic-like pains, diarrhœa, or, on the contrary, constipation, besides less local effects, such as anæmic and neurotic states. No certain diagnosis is possible, 'unless the eggs or proglottides of the *corpus delicti* be observed, and these must always be identified before so radical a cure as treatment with anthelmintics is begun.' Of these anthelmintics—which are intended to expel the parasite from the intestine—there is no lack in the pharmacopœia. But, as Leuckart insists with evident reasonableness, prevention is better than cure.

See R. Leuckart, *The Parasites of Man*, trans. by W. E. Hoyle (Edin. 1886).

Tapioca, a farinaceous substance obtained from cassava or manioc (when prepared as explained at MANIOC) by drying it while moist on hot plates, so that the starch grains swell or burst, and the whole agglomerates in small lumps. The name is sometimes given to a kind of Sago (q.v.).

Tapir (*Tapirus*), a genus of Ungulata, of the section Perissodactyla, having a bulky form, with moderately long legs; the fore-feet four-toed, the hind-feet three-toed; the skin thick, the hair short; the tail very small; the neck thick; the ears short; the eyes small; the muzzle elongated; the nose prolonged into a short, flexible proboscis, which, however, does not terminate in an organ of touch and prehension, like that of the elephant; six incisors, two canine teeth, and fourteen molars in each jaw, the molars separated from the canine

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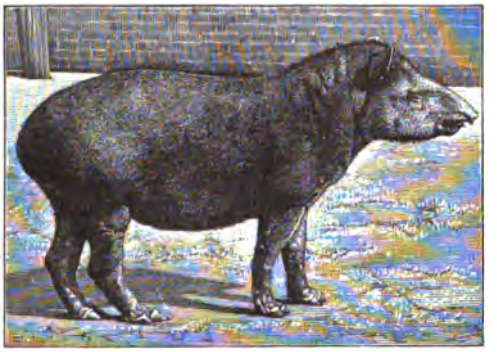
teeth by a wide interval. There are certainly four species, of which three are American and one Oriental. The best known is the American Tapir (*T. terrestris*), which is about the size of a small ass, and is common in almost all parts of South America, its range extending as far south as the Strait of Magellan, although it suddenly ceases to be found at the Isthmus of Panamá. Its colour is a uniform deep brown, but the young are—as in many other animals (e.g. the Puma) which when adult are of all one colour—marked with yellowish fawn-coloured stripes and spots. The skin of the neck forms a thick rounded crest on the nape, with a short mane of stiff hair. The tapir inhabits deep recesses of the forest, and delights in plunging and swimming in water. It feeds chiefly on young shoots of trees, fruits, and other vegetable substances,



American Tapir (*Tapirus terrestris*).

but is ready to swallow almost anything that comes in its way. Pieces of wood, clay, and pebbles are often found in its stomach. It sometimes commits great ravages in cultivated grounds; a large herd of tapirs sallying forth from the forest by night, trampling and devouring all that they find in the fields. The tapir is a very powerful animal, and, protected by its thick hide, forces its way through the forest where almost no other quadruped can. When assailed by the jaguar it seeks to get rid of him by rushing through thick underwood, and if it can reach water is often successful by plunging in and diving. It is inoffensive, never attacking man, but when hard pressed by dogs makes a violent resistance, and inflicts severe bites. It is very easily tamed, and becomes extremely familiar; but its large size makes it a troublesome pet. Its hide is useful, and its flesh is eaten, although rather dry. The other two American species—viz. *T. bairdi* and *T. dowi*—are generally regarded as generically distinct from the rest, and have been termed *Elasmognathus*. The Malayan Tapir (*T. indicus*) is found in Malacca, Sumatra, &c. It is larger than the American tapir, and its proboscis is rather longer in proportion. The neck has no mane. The colour is glossy black, except the back, rump, and sides of the belly, which are white. The colours do not pass gradually one into another, but the line of separation is marked, giving the animal a very peculiar appearance. The habits of this species are very similar to those of the American tapir, and it is equally capable of domestication. The young are striped and spotted as in that species.

The remains of tapirs have been found in Miocene and subsequent strata. In all about twelve species have been determined. Tapir-like animals are common in Eocene beds. *Lophiodon* appears to have been the precursor of the tapirs during the Eocene period. True tapirs are found in beds of an earlier age (Miocene) in Europe than in America (Post-Pliocene). Hence it has been argued that the tapir is an Old-World form which migrated to the New World, and ultimately established itself there upon a firmer footing.

Tapping is an operation frequently resorted to for the removal of fluid accumulations, particularly in the pleural and peritoneal cavities. It consists in introducing one end of a small tube into the cavity, with the least possible injury to the skin, and withdrawing so much of the fluid as is desired by siphon action, or by means of a vacuum. Various contrivances (aspirators) have been used to effect this without allowing air to enter—the commonest form that devised by Dr Potain. These instruments have done much for the certain diagnosis and safe treatment of fluid collections in various situations. Besides dropsical or inflammatory exudations in the pleura or peritoneum, similar collections in the pericardium can be thus dealt with; cysts and abscesses, when deep-seated and obscure, can be recognised with certainty and sometimes cured; and occasionally the fluid present in chronic hydrocephalus can be diminished with amelioration of symptoms. Collections of air or gas within the body may sometimes be removed in the same way with good results. See DROPSY, PLEURISY, &c.

Taprobane. See CEYLON.

Tapti, a river of Bombay, rises in the Betúl district of the Central Provinces, and flows 450 miles west through the Sátpura uplands and the districts of Candeish and Surat to the Gulf of Cambay, 17 miles below the town of Surat. Even small vessels of 40 to 50 tons burden cannot ascend higher than Surat. The port of Suwali, at the mouth, is now deserted, and the lower channels of the river are being silted up.

Tar. The nature of tar differs according to the raw material from which it is derived. In nearly all cases it is a thick, black, or dark-brown liquid of complex composition. The tars of commerce have a strong characteristic odour varying with their origin. When wood, coal, or shale is subjected to destructive distillation in close vessels there are produced (1) incondensable gases, (2) a liquid portion consisting of various substances soluble in water, and (3) another portion composed of bodies insoluble in water. This third or last portion is generally called tar. In former days wood-tar was used for much the same purposes as that for which the residual pitch derived from it is employed now. The time has come when any kind of tar is looked upon rather as a mother-liquor from which valuable chemical substances are obtained than as a material to be used by itself in the arts.

Wood-tar.—Different woods yield tars of a so far unlike nature. The tar from pine-wood is not the same as that from oak or beech. Most of the wood-tar produced in Europe is obtained from the Scotch fir (*Pinus sylvestris*), but it is also got from other pines and from larch. Coniferous wood yields from 14 to 18 per cent. of tar, while from the wood of dicotyledonous trees of temperate regions only from 9 to 10 per cent. is obtained. Wood-tar is still made by the very old process of burning wood in cone-shaped piles covered over with sufficient earth and turf to exclude air, of which just enough is admitted to promote combustion by means of apertures at the bottom where the pile is ignited. The pile stands on a clay floor, and it is fully a week before any tar is collected. By this rude process much charcoal, crude acetic acid, and other products are wasted; but these are now very often saved by distilling the wood in close vessels. Several forms of retorts or kilns are

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employed to make charcoal and at the same time to yield tar. One kind of kiln is in the shape of an oblong brick chamber, arched over, and with a floor formed into a sort of channel sloping from the middle of the chamber, where it is highest, to each of the end walls. Its internal size is 25 feet long, 12 feet wide, and 15 feet to top of arch. The chamber is closely filled with wood, the only place where a small space is left being where the flame or heat from the fire enters at one side. Air must be as far as possible excluded during the charring of the wood, which in a kiln of this kind may consist of stumps, branches, and any sort of odd pieces. The fire hearth, placed just outside the side wall of the chamber, has no grate, so as to prevent too much draught. As the tar is formed it runs down the right and left inclines of the channel, and at each end, by one branch of a two-way pipe, is led into a tar vessel, while the more volatile acetic acid and wood-spirit pass by the upper branch of the pipe into a condenser. Wood-tar contains (besides the tar proper) a large admixture of watery distillate, and gives on redistillation acetic (pyroligneous) acid, wood-spirit or methyl-alcohol, methyl-acetate, acetone, wood-creasote, and wood-naphtha, consisting of hydrocarbons very often containing methyl groups replacing hydrogen; also heavy oils and crystalline bodies not yet much investigated and that disappear in the pitch. Tar from some resinous woods contains oils resembling turpentine in composition. Before American petroleum became so cheap an oil of this kind was made in Norway and burned in paraffin-lamps.

In medicine tar and tar-ointment are used for cutaneous diseases (such as psoriasis), and much controversy arose as to the virtues of tar-water, regarded by Bishop Berkeley as almost a panacea. Tar-water was the watery liquor obtained when a quart of wood-tar and a quart of water had been well shaken together and allowed to settle. This Berkeley found was used, taken internally, as a preventive and palliative of smallpox in the American colonies. He tried it and found it exceedingly useful, he says, for consumption, fevers, ulcers, pleurisy, gravel, stomachic disorders, &c.; and on it bases his *Siris or Treatise concerning the Virtues of Tar-water*, a chain of philosophical reflections, which, as Professor Fraser says, connects tar-water with the throne of the Divine Ruler of the universe.

The use of tar or pitch for 'tarring and feathering' obnoxious persons, still understood to be practised in some parts of the United States in execution of mob-law, is of very ancient origin, dating apparently at least from the times of the Crusades. According to Rymer's *Foedera* and Hakluyt's *Voyages*, King Richard I. enacted for the royal navy that a thief or felon 'lawfully convicted, shal haue his head shorne and boyling pitch powred vpon his head, and feathers or downe strawed upon the same, wherby he may be knowen.' Scarron (q.v.) was reported to have tarred and feathered his own person as a carnival disguise.

Coal-tar or Gas-tar.—In the making of gas for illumination the coal is distilled at a higher temperature than that used for the production of ordinary coke, the result being that the constituents of the tar from the two processes differ. Gas-tar contains more benzole and other colour-making materials than coke-tar. See COAL-TAR.

Coke-oven Tar.—Until recently the recovery of the volatile products, such as tar and ammonia, given off during the conversion of coal into coke was neglected. Coke-ovens are, however, now constructed which, among other improvements, include the collection of the tar, the nature of which depends upon the temperature at which the coal is distilled. In the Jameson coke-oven the temperature is low at the point of destructive distillation, and consequently the tar produced contains paraffin and the higher phenols. On the other hand, the Simon-Carvés coke-oven, in which a high temperature is reached, produces a tar more resembling that obtained in coal-gas making. It is characterised by the presence of naphthaline and Anthracene (q.v.), and small quantities of benzole and carbolic acid.

Blast-furnace Tar.—In some cases the tar from iron blast-furnaces in which coal is used as fuel is now recovered. It is of an intermediate quality between the two kinds of coke-tar just noticed, but rather more resembling that produced at a high temperature.

Lignite or Brown Coal and Peat were distilled some years ago to yield tars. The former gave a considerable yield of buttery tar containing about 15 per cent. of paraffin. From the latter a tar was obtained, also yielding some paraffin.

Tara. See TARO.

Tara, HILL OF, an eminence (507 feet) in County Meath, 7 miles SSE. of Navan. Here prior to 560 is said to have stood the hall of the kings of Ireland; and here O'Connell (q.v.) held a monster meeting on 15th August 1843.

Tara Fern (*Pteris aquilina*), a large species of Bracken (q.v.), the rhizome of which was one of the principal articles of food of the Maoris before the settlement of New Zealand by British colonists. The roots, about an inch in circumference, were cut in pieces, dried, and stacked. For use the root was steeped in water, dried in the sun, and then roasted. Good flour was obtained from it by beating on a stone.

Taranaki (formerly New Plymouth), a provincial district of New Zealand, occupying the south-west corner of the North Island; area, 2,137,000 acres, of which three-fourths is dense forest. The coast is lined with iron-sand. The soil and climate are good for rearing stock, and being well watered grass and root-crops are abundant. Pop. (1891) 22,169. Capital, New Plymouth; pop. 4000. See B. Wells's *History of Taranaki* (New Plym. 1878).

Taranto (anc. *Tarentum*), a seaport of Southern Italy, in the province of Lecce, situated on a rocky islet between the Mare Grande or Gulf of Taranto and the Mare Piccolo, an extensive natural harbour on the east side of the town, 72 miles SSE. of Bari by rail. The harbour is sheltered by two small islands, San Paolo and San Pietro, the *Chœrades* of antiquity, and is closed by Cape San Vito on the south-east. The town is joined to the mainland by a six-arched bridge on the east side, and on the west by an ancient Byzantine aqueduct. The principal buildings are a modernised cathedral dedicated to St Cataldo, a dubious 6th-century Irishman said to have been the first bishop of Tarentum, and a castle erected by Charles V. The Mare Piccolo is still famous for its shell-fish, and a considerable portion of the population (1891, 25,246) finds employment in oyster and mussel fisheries. The honey and fruit are still famous also, but the people are to-day as lazy as in Horace's time.

The ancient Tarentum, founded by a body of Spartan emigrants about 708 B.C., grew to be the sovereign city of Magna Græcia. Here flourished about 400 B.C. the philosopher and geometer Archytas, under whom it became the centre of the Pythagorean sect. At the height of its greatness it insolently provoked a quarrel with Rome (281), was saved for a little by Pyrrhus, king of Epirus, but taken in 272, and retaken and punished severely in 207 for revolting to the side of Hannibal five years before. Later it belonged

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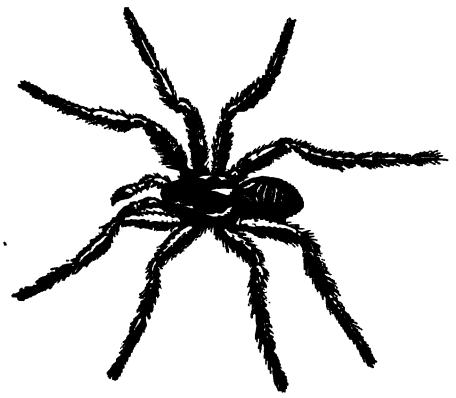
to Byzantine, Saracen, and Norman masters, sharing the fortunes of the kingdom of Naples.

There is a German history of ancient Tarentum by Döhle (1877), an exhaustive history by De Vincentiis (Naples, 1878 *et seq.*), and a topographical description by Gagliardo (Tarent. 1886).

Tarantula (*Lycosa tarantula*), a species of spider, of a genus to which the name Wolf-spider is often given, a native of the south of Europe. It derives its name from Taranto, where it is very plentiful. It is one of the largest of European spiders, and is a swift hunter. Its bite is much



Tarantula Spider (*Lycosa tarantula*), ⅔ natural size.

dreaded, and was long supposed to cause a kind of dancing madness or tarantism; but, although this spider does give a venomous bite (as all spiders do), its powers have been grossly exaggerated.

TARANTISM was a leaping or dancing mania, accompanied with gesticulations, contortions, and cries somewhat resembling those of St Vitus's Dance and other epidemic nervous diseases of the middle ages; but the affection differed from these in several respects, and was doubtless some not then recognised nervous malady, the symptoms of which are plainly those of hypochondriacal and hysterical affections. Although the sufferers were subjected to extraordinary treatment, such as being buried up to the neck in earth, the success of music was apparently so universal and invariable that a class of tunes is said to have been composed, called *Tarantella* or *Tarentella*, to be employed in the cure of the tarantati. The name may, however, have been given to the dance (with pipe and tambourine accompaniment) simply because popular in and near Taranto, and have passed to all musical compositions in the rapid triplet time of the dance. See Hecker, *Epidemics of Middle Ages;* Madden, *Phantasmata;* Bergsoe, *Die Italienische Tarantel.*

Tarapacá, till 1883 the southernmost department of Peru, but annexed by Chili after the war. Area, 19,300 sq. m.; pop. (1891) 47,313. The country contains vast fields of nitrate of soda, as well as silver-mines, deposits of guano, and flocks of sheep, alpacas, &c. Capital, Iquique (q.v.). See W. H. Russell's *Visit to Chile* (1890).

Tarare, a manufacturing town of France, in the dept. of Rhone, stands at the foot of Mount Tarare, 21 miles NW. of Lyons by rail. It manufactures muslins, tarletans, silks, satins, plush, &c. Pop. (1872) 12,888; (1891) 11,738.

Tarascon, a walled town of France, in the Provençal department of Bouches-du-Rhone, 14 miles SW. of Avignon by rail and 8 N. of Arles. King René's castle, dating from 1400, is picturesque and well preserved; and a Gothic church (1187–14th century) is dedicated to St Martha, who here is said to have subdued a dragon. But Tarascon is chiefly famous through associations with the immortal Tartarin. It has manufactures of woollen and silk fabrics, 'saucissons d'Arles,' &c. Pop. (1872) 8479; (1891) 6597.

Taraxacum, or DANDELION-ROOT, a tonic laxative in disorders of the liver. See DANDELION.

Tarazona, an episcopal city of Spain, in the province of Saragossa, 20 miles S. of Tudela, on an affluent of the Ebro. Pop. (1887) 8520.

Tarbagatai, mountains, 10,000 feet high, in Russian Central Asia, on the frontier between Semipalatinsk on the north and Chinese Zungaria.

Tarbes, a town in the south of France, capital of the dept. of Hautes-Pyrénées, stands on the left bank of the Adour, 30 miles ESE. of Pau by rail. The cathedral is the principal building. There is a government cannon-foundry in the place, which is the seat of an active general trade. Pop. (1881) 17,744; (1891) 24,784. Tarbes dates from the time of the Romans, and its bishopric was founded in the year 420. It was in the hands of the English in the 13th and 14th centuries.

Tardigrada (Lat. 'slow-paced'), a name given to the group or sub-order of mammals containing the two genera of Sloth (q.v.), remarkable for their sluggish movement and extraordinary tenacity of life under injury, starvation, or poison.

Tare (*Ervum*), a genus of plants of the natural order Leguminosæ, sub-order Papilionaceæ, distinguished from Vicia (see VETCH), to which it is nearly allied, by a cipitate stigma, downy all over. It contains only a few species of weak climbing plants, natives of the temperate parts of the eastern hemisphere. One of these is the Lentil (q.v.). Two (*E. hirsutum* and *E. tetraspermum*), generally known by the name of Tare, are common in cornfields and hedges in Britain. They have very small flowers and pods; the leaves are pinnate, and the leaflets small. They afford nourishing food for cattle. A species of tare (*E. sativum*), with an upright branching habit, is cultivated in some parts of Europe for its herbage, which is used for feeding cattle. The bulk of herbage is considerable, and its nutritious character is high. The leaves have from 8 to 14 pairs of leaflets. The plant thrives well in poor sandy soils. It is not supposed that the *Tare* of the New Testament has any affinity to these plants: it is doubtful what it is, but it seems not improbable that it is the Darnel (q.v.).

Tare and Tret, certain deductions usually made from the gross weight of goods. *Tare* is the weight of the box, cask, bag, or wrapping containing the goods; and the amount is obtained either by weighing the empty package itself, by taking an average of a few similar packages of equal size, or by mutually agreeing upon a certain proportion of the gross weight. The remainder is the *net weight.* Another deduction, at the rate of 4 lb. for every 104 lb., or $\frac{1}{26}$th of the net weight, is then made, as an allowance for waste through dust, &c., and is called *tret.*

Tarentum. See TARANTO.

Target, in its modern sense, is the mark for aiming at in practising with the cannon, rifle, or bow and arrow. In its more ancient meaning a target or targe was a shield, circular in form, cut out of ox-hide, mounted on light but strong wood, and strengthened by bosses, spikes, &c. Of modern targets the simplest is that used for Archery (q.v.). With regard to rifle targets, the spread of the Volunteer movement and the numerous rifle-matches have caused ranges to be constructed over the whole country. Targets are usually painted white and have a black 'bull's-eye' in the centre

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(varying from 8 inches diameter in targets at 200 yards to 3 feet at 1000 yards), and a region round this called 'centre.' The accessories are a butt, artificially constructed or cut in the face of a hill, to catch stray shots; a marker's shot-proof cell, near the targets; and a range of such length as can be procured. Previous to the inaugurating of the Wimbledon meeting in 1860 all targets were circular, and made of iron. From that year till 1873 inclusive they were square iron plates; but in 1874 targets of canvas and paper stretched on an iron frame were introduced, together with practice at objects moving at various rates of speed and at a greater or less distance, for which purpose a 'running-man target' was devised, consisting of a millboard figure running on wires, worked by the marker in the butt. There are also self-marking or automatic targets, constructed of several pieces, each of which when struck signals the fact; and disappearing targets, only visible to the firer for very short periods of time. For these and for field firing, targets take the form of flat wooden dummies shaped like men standing or kneeling. Dummies are also used as targets for field artillery practice. Heavy guns firing on a sea-range generally use a floating target, a barrel carrying a flag or a 6-feet-square wooden target on a raft.

Targovica, or TARGOWICZ, a small town in the Russian government of Kieff, was the scene (May 1792) of a plot by five Polish nobles to overthrow the constitution of 1791. See POLAND.

Targum (Assyr. *ragâmu*, 'to speak,' whence *targumânu*, 'speaker'), the general term for the Aramaic versions—often paraphrases—of the Old Testament, which became necessary when, after and perhaps during the Babylonian Exile, Hebrew began to die out as the popular language, and was supplanted by Aramaic (see ARAMÆA).

The origin of the Targum itself is shrouded in mystery. The first signs of it—as an already fixed institution—have been found by some in Nehemiah, viii. 8, and according to tradition Ezra and his coadjutors were its original founders. However this be, there can be no doubt that its beginnings belong to a comparatively early period. The Mishna (q.v.) contains a number of strict injunctions respecting it, and also respecting a certain guild of Meturgemans (whence 'dragoman') or interpreters, who had sprung up as professional followers of those learned men who, at a previous period, had volunteered their services in the translation and paraphrastic interpretation, both activities being implied by the term. At first, and indeed for many centuries, the Targum was not committed to writing, for the same reason that the 'Oral Law' or Halakhah (see EXEGESIS) itself was not at first intended ever to become fixed as a code for all times. In the course of time, however, both had to yield to circumstances, and their being written down was considered preferable to their being utterly forgotten, of which there was no small danger. Yet a small portion only of the immense mass of oral Targums that must have been produced has survived. All that is now extant are three distinct Targums on the Pentateuch, a Targum on the Prophets, Targums on the Hagiographa—viz. on Psalms, Job, Proverbs, the five 'Megilloth' (Song of Songs, Ruth, Lamentations, Esther, Ecclesiastes), another Targum on Esther, one on Chronicles, one on Daniel, and one on the apocryphal pieces of Esther. The most important of the three Pentateuch Targums is the one named after Onkelos, probably a corruption of Akylas (Aquila, a proselyte, one of Gamaliel's pupils), whose Greek version had become so popular that this Aramaic version was honoured with being called after it. This Targum seems to have been originally produced among the scholars of R. Akiba between 150 and 200 A.D. in Palestine, and sent to Babylonia, where it was more needed; wherefore it is called Babli. Here it was probably edited about 300, and afterwards vowelled in the Babylonian method. Subsequently vowelled in the Palestinian method, it spread from Palestine over the world. It is an excellent translation for the people, and adheres more closely to the Massoretic text than any other ancient translation. It is useful for the exegete, the linguist, and the antiquary.

Two other Targums on the Pentateuch have hitherto been known as Targum Jonathan ben Uzziel and Targum Jerushalmi. They are of Palestinian or Syrian growth. Jerushalmi is fragmentary, and appears to be a Haggadic supplement to Onkelos. The Pseudo-Jonathan, by its maturer angelology, its abbreviations, and other signs, appears to be a later recension of the Jerushalmi. It cannot well have been composed before 750. As a version this Targum is of small importance; but it is valuable as a storehouse of allegories, parables, sagas, and the like popular poetry of its time. Its language and grammar are exceedingly corrupt; it abounds, moreover, with foreign—Greek, Latin, Persian, and Arabic—terms. It mentions Constantinople (Numbers, xxiv. 19, 24); and names Khadija and Fatima (Genesis, xxi. 2). Its general use lies more in the direction of Jewish literature itself, as well as of archæology and antiquities of the early Christian centuries, than in that of a mere direct interpretation of the Bible text. The Targum on the Prophets is generally and erroneously ascribed to Jonathan ben Uzziel, an eminent scholar of Hillel the Elder; the fact being that, except one spurious Talmudical passage, in which mention is made of his having translated the Prophets, this Targum is everywhere else, from the Talmud down to the authorities of the 10th century, ascribed to one R. Joseph, president of the Babylonian academy of Sora about 322. This Targum, while tolerably literal in the first—the historical—books, gradually becomes a frame for Haggada, which it introduces at every turn and at great lengths. It is considerably interpolated, containing historical bits disguised, or rather typified, lyrical pieces of some poetic value, and much Messianic lore. In language and general manner it resembles Onkelos, which evidently lay before the author.

Joseph the Blind, to whom the foregoing Targum is ascribed, is the reputed author of Targums on the Hagiographa. Several centuries lie between him and them, their date being approximately between 800 and 1000. Certain distinctions between the different books must further be made. The Targums on Psalms, Job, and Proverbs were probably contemporaneous compositions due to private enterprise in Syria. The two former are made more paraphrastic than the last, which resembles closely the Syriac version. The paraphrase on the five 'Megilloth' mentions the Mohammedans, and is of later date; probably one man's work. It is principally a collection of more or less poetical fancies, traditions, and legends, to which the single verse in hand merely seems to furnish the keynote. Its dialect lies somewhat between the East and West Aramaic. The Targum on the Book of Chronicles—almost unknown until it was printed in the 17th century—also belongs to a late period, and was probably composed in Palestine. There are some useful philological, historical, and chiefly geographical hints to be gleaned from it, but nothing more; least of all can it be used exegetically. A Persian version of a Targum on Daniel (unedited) is all that has been discovered on that book as yet. It was probably composed in the 12th century, the

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influence of the early Crusades being plainly visible in it. On the paraphrase of the apocryphal pieces of Esther we shall not dwell here, any more than on the scanty fragments of a 'Palestinian Targum' that are found either interspersed in the general (Babylonian) Targum, or as independent pieces. It seems probable that more of this Palestinian version will come to light some day, as authorities of a few centuries back still quote from it rather largely. At present, however, their quotations are nearly all that is known. By 900 in Africa and Spain the Targum had begun to be disused in public, Arabic or the national language being substituted. In Yemen the Aramaic Targum is still used in the ancient manner, the meturgeman standing beside the reader and rendering verse by verse.

The Targum of Onkelos unvowelled was first printed in Bologna, 1482; vowelled, Lisbon, 1491; more or less incorrect in the Bomberg Rabbinical Bible of Venice (1518) and in subsequent editions; the Complutensian Polyglot (1517); the Biblia Regia of Antwerp (1569); and Walton's Polyglot (Lond. 1657). Buxtorf's edition (1618–19) is vitiated by attempts to conform it to biblical Aramaic. Sabionetta's edition (1557) is the best till Abr. Berliner's reproduction of this (Berlin, 1884), with an exhaustive essay. The Targum on the prophets appears in the Bomberg, Complutensian, Antwerp, Buxtorf, and Walton Bibles. It is edited by Paul de Lagarde (Leip. 1872). He edited the Targum on the Hagiographa (1873). See Frankel, *Zu d. Targum der Propheten* (Breslau, 1872); Pauli, *Chaldee Paraphrase on Isaiah* (Lond. 1872); the *Targum of Onkelos and Jonathan on the Pentateuch* (1862 and 1865), by Etheridge.

Tarifa, the southernmost town on the continent of Europe, is a seaport of Spain, in the province of Cadiz in Andalusia, and is situated 21 miles SW. of Gibraltar. The town is still quite Moorish in aspect, and retains its alcazar and battlemented Arab walls. A causeway connects it with a small island, on which are some powerful fortifications and a lighthouse, 135 feet above sea-level. Tunny and anchovy fishing is and has been since Roman times the principal occupation of the inhabitants, but the preparation of leather is also carried on, and there is a trade in sweet oranges. Tarifa, called Julia Joza by Strabo, was occupied in 710 A.D. by the pioneers of the Moorish invasion, under Tarif Abû-Zor'a, whence it obtained its Arabic name of Jezîret-Tarîf (Tarif's island). It was taken from the Moslems, after an obstinate siege, in 1292, by Sancho IV. of Castile, and its first Spanish governor was Alonzo Perez de Guzman, celebrated in the Romancero for his valiant defence of the town against the besieging Moors in 1294. During the Peninsular war Tarifa was successfully defended by Gough with 1800 British troops and 700 Spaniards against a besieging army of 10,000 French (December 1811 to January 1812). Pop. (1887) 13,206.

Tariff (from the town of Tarifa, where, during the rule of the Moors in Spain, duties were collected), a table or catalogue, generally drawn up in alphabetical order, of the duties, drawbacks, bounties, &c. charged or allowed on different kinds of merchandise, as settled by authority, or agreed to between different states. The principles of the tariffs of different countries depend on their respective commercial policy, and on the fluctuating interests and wants of the community. They may be prohibitory, retaliatory, or differential; and may be assessed *ad valorem*, &c. See CUSTOMS, FREE TRADE, PROTECTION.

Tarik. See GIBRALTAR.

Tarim River. See TURKESTAN (EASTERN); and ASIA, Vol. I. p. 486.

Tarlatan, a thin, gauze-like fabric of cotton, used for ladies' ball-dresses, &c. It is either finished white or dyed or printed in colours. Tarare is the chief centre of this manufacture; the Swiss tarlatans are inferior.

Tarlton, RICHARD, a famous clown of Queen Elizabeth's day, who died in 1588, and on whom was fathered a well-known Jest-book (q.v.).

Tarn, a dept. in the south of France, bounded on the N. by the depts. of Aveyron and Tarn-et-Garonne, receives its name from the river Tarn, an affluent of the Garonne. Area, 2217 sq. m.; pop. (1881) 359,223; (1891) 346,739. The surface is in general elevated, and in the south and south-east are the Montagne Noire and the Lacaune branches of the Cévennes. Wooded mountains, vine-clad hills, beautiful valleys, and fertile or grass-producing tracts are the principal features of the landscape. A considerable part of the surface is covered with forests, chiefly of oak and beech. The dept. is for the most part agricultural, grain, wine, fruit, potatoes, chestnuts, and cattle being amongst the chief produce. Coal is mined; and wool-spinning, silk-spinning, dyeing, the making of steel goods, glass, and pottery are local industries. Tarn is divided into four arrondissements—Albi, Castres, Gaillac, and Lavaur; Albi is the capital. See the work on the dept. by Bastié (1876–77).

Tarn-et-Garonne, a small dept. in the south of France, bounded on the SE. by the dept. of Tarn. Area, 1436 sq. m.; pop. (1881) 217,056; (1891) 206,596. The principal river is the Garonne, with its affluents the Tarn and Aveyron. The surface is largely occupied by plateaus, about 1000 feet in average altitude; the highest hills do not rise above 1600 feet. The climate is temperate. Cereals are raised, also wine, fruit, hemp, &c.; there are some manufactures of silk, paper, candles, and soap. The dept. is divided into the three arrondissements of Montauban, Castelsarrasin, and Moissac; Montauban is the capital. See a work by Moulenq (1879–85).

Tarnopol, a town of Austrian Galicia, on the Sereth, 80 miles ESE. of Lemberg by rail. Pop. (1890) 26,097, half being Jews.

Tarnow, a trading town of Austrian Galicia, 50 miles E. of Cracow by rail. It has a theological college and a fine cathedral. Pop. 27,694.

Taro (*Colocasia macrorhiza*, or *Arum esculentum*), a plant of the natural order Araceæ, of the same genus with the Cocco (q.v.) or Eddoes, and cultivated for its roots, which are a principal article of food in the South Sea Islands. They are washed to take away their acridity, and cooked in the same way as bread-fruit; they may also be boiled or made into pudding. A pleasant flour is made of taro. The plant has no stalk; broad, heart-shaped leaves spring from the root; and the flower is produced in a spathe. The leaves are used as spinach. See HAWAII.

Tarots. See CARDS.

Tarpan. See HORSE, Vol. V. p. 793.

Tarpaulin, strong linen or hempen cloth, coated with tar or pitch to render it waterproof. An elastic pitch from bone tar or stearine residues is used by tarpaulin makers.

Tarpeian Rock. See CAPITOL.

Tarpon (*Megalops atlanticus*), a food-fish of America belonging to the Clupeidæ or herring family, is common in the warmer Atlantic waters and off the shores of the Gulf states, and attains a length of 6 feet. It is sometimes called Jew-fish.

Tarquinii. See CORNETO.

Tarquinius, the family name of two kings of Rome, derived from the Etruscan city of Tarquinii—and doubtless implying the domination of that city over a district south of the Tiber. The first, Lucius Tarquinius Priscus, is said to have

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reigned at Rome 616–578 B.C., and to have considerably modified the constitution, and to have begun the Servian agger and the Circus Maximus.—Lucius Tarquinius Superbus (534–510), the seventh and last king of Rome, was a capable but intolerable despot, the chief events of whose reign are given at ROME (Vol. VIII. p. 787). See LUCRETIA.

Tarragon, an aromatic plant (*Artemisia Dracunculus;* see WORMWOOD) used for flavouring vinegar, sauces, &c.

Tarragona, a seaport of Spain, chief city of the modern province of Tarragona, situated on the Mediterranean shore, at the mouth of the Francoli, 60 miles W. of Barcelona by rail. The upper and older town is irregular and dirty, and is girdled with ramparts; the lower is regular and open, and defended by two forts. The Gothic cathedral dates from about 1120. The industries are spinning and weaving (chiefly in silk, also in jute), felt and lace making. But of much greater importance is the shipping and transport trade. The annual tonnage of ships that enter reaches half a million, and the imports and exports reach over thirty million *pesetas* respectively. Pop. (1887) 27,225. Tarragona, the Roman *Tarraco*, was the capital of the Roman province of Tarraconensis. Among the Roman antiquities are the remains of an amphitheatre, which has been used as a quarry; a magnificent aqueduct, still used, 96 feet high and 700 feet long; and near the town the Tower of the Scipios, much decayed. Tarragona was taken by storm by the French under Suchet in 1811, but in August 1813 its fortifications were blown up by him when unable longer to hold out against the English.

Tarrytown, a village of New York, on the Hudson, 21 miles by rail N. of New York City. It has some manufactures. Close by Major André was captured in 1780; and two miles to the south Washington Irving spent his last years, and there lies buried. Pop. (1890) 3901.

Tarshish, probably the same as *Tartessus*, the Latin form for the Greek name of a city and emporium of the Phœnicians in Spain, near the mouth of the Guadalquivir, but used of the whole region—subsequently known as Andalusia (q.v.). It is frequently mentioned in Scripture. Speaking of Tyre, Ezekiel (xxvii. 12) says—'Tarshish was thy merchant by reason of the multitude of all kinds of riches;' notably there were here great fisheries of tunny and murœna, and rich mines of silver and other metals. Others contend that Tarshish was simply Tarsus; and some have thought a part of Yemen was meant, near Ophir (q.v.).

Tarsia-work. See INLAYING.

Tarsipes, a small Australian honey-sucking marsupial, of the family Phalangistidæ, about the size of a mouse. See MARSUPIALS, PHALANGER.

Tarsus, anciently chief city of Cilicia, and one of the most important in Asia Minor, on the river Cydnus, 12 miles from the sea, in the midst of a productive plain. It was a great emporium for the traffic carried on between Syria, Egypt, and the central region of Asia Minor. In the time of the Romans two great roads led from Tarsus, one north across the Taurus by the 'Cilician Gates,' and the other east to Antioch by the 'Amanian' and 'Syrian Gates.' Tarsus, which was sacred to Baal Tars, and is thought by some to have been founded by Sennacherib 690 B.C., was probably of Assyrian origin, but the first historical mention of it occurs in the *Anabasis* of Xenophon, where it figures as a wealthy and populous city, ruled by a prince tributary to Persia. In the time of Alexander the Great it was governed by a Persian satrap; it next passed under the dominion of the Seleucidæ, and finally became the capital of the Roman province of Cilicia (66 B.C.). At Tarsus Antony received Cleopatra, when, as Aphrodite, she sailed up the Cydnus, with magnificent luxury. Under the early Roman emperors Tarsus was as renowned for its culture as for its commerce, Strabo placing it, in respect to its zeal for learning, above even Athens and Alexandria. The natives were vain and luxurious; a Moslem general estimated their number at 100,000. Weaving goats' hair was the staple manufacture. It was the birthplace of the apostle Paul (q.v.), who received the greater part of his education here; the Stoic Antipater and the philosopher Athenodorus were also natives, and here the Emperor Julian was buried. Gradually, during the confusions that accompanied the decline of the Roman and Byzantine power, it came into the hands of the Turks, and fell into comparative decay; but even yet this modern, squalid, and ruinous city, under the name of *Tarso* or *Tersus*, has a permanent population of 7000, and a pop. of 30,000 in winter, and exports corn, cotton, wool, gall-nuts, wax, goats' hair, skins, hides, &c.

Tartan. See HIGHLANDS.

Tartar, a mixture of bitartrate of potash and tartrate of lime, is a deposit formed from wine, and known in its crude form as Argol (q.v.). The name, given by the alchemists, is usually referred to Gr. *tartaros;* but some derive it from Arab. *durd*, 'dregs.' For Cream of Tartar, &c., see TARTARIC ACID. For tartar on the teeth, see DENTISTRY; for tartar emetic, ANTIMONY.

Tartaric Acid, $C_2H_2(OH)_2(COOH)_2$, exists free or in combination with bases in the fruits and juices of many plants. In the rowan, grape, and pine-apple it gives a subacid flavour. The commercial source is *tartar*, which is boiled with chalk, and the insoluble tartrate of lime is removed by straining. On treatment with sulphuric acid and purification, tartaric acid is obtained in the form of large transparent, prismatic crystals, which are readily soluble in water. They possess a pleasant acid taste, and the solution reddens litmus. When rubbed in the dark the crystals become luminous. When tartaric acid is heated it melts, forming the isomeric metatartaric acid, and by further heating it is broken up into a number of bodies, formic acid, acetone, and carbonic acid being among the number.

Besides the tartaric acid of commerce there are others, isomeric with the above, known to chemists. These differ mainly in the power of deviating the plane of Polarised Light (q.v.) to the right or the left. The ordinary acid deviates it to the right, and another deviates it to the left, so that when mixed in equal proportions and dissolved the solution has no action on polarised light at all. Such a compound exists in nature, and is known as *racemic acid*. It gave rise to many important researches and discoveries, owing to its similarity to tartaric acid, except in its being inactive to polarised light. To Pasteur is due the above explanation of its peculiar behaviour. Tartaric acid is largely used in dyeing and calico-printing, and in the manufacture of aerated waters and confections. Being a dibasic acid (see ACIDS), it forms a large number of salts, many of which are important. *Bitartrate of potash*, or *cream of tartar*, $KHC_4H_4O_6$, is obtained by purifying the crude argol by crystallisation. It is used, along with baking soda, by housewives, as a baking powder. Medicinally it is a useful purgative, and is a favourite domestic remedy for clearing the blood in spring-time. *Tartarated iron* or *tartrate of iron and potash* is a mild tonic, which, when dissolved in sherry, constitutes iron wine. *Tartrate of potash and antimony*, or *tartar*

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emetic, $KSbOC_4H_4O_6$, has been long used in medicine, in doses of $\frac{1}{15}$ to $\frac{1}{4}$ of a grain; it is a powerful sudorific, but in larger doses, 1 to 3 grains, it acts as an emetic. It has gained considerable notoriety through being employed in several famous poisoning cases which have come before the public. It should never be in unskilful hands, as $\frac{1}{2}$ grain has proved fatal to a child, and 2 grains in one case at least were fatal to an adult.

Tartars (better TATARS), originally certain Tungusic tribes in Chinese Tartary, but extended to the Mongol, Turkish, and other warriors, who under Genghis Khan and other chiefs were the terror of the European middle ages. The name, originally Turkish and Persian *Tátar*, was doubtless changed to Tartar, either consciously or unconsciously, because they were supposed to be like fiends from hell (Gr. *tartaros*, 'hell'). The term is used loosely for tribes of mixed origin in Tartary, Siberia, and the Russian steppes, including Kazan Tartars, Crim Tartars, Kipchaks, Kalmucks, &c., and has no definite ethnological meaning. In the classification of languages Tartaric is used of the Turkish group. See the articles TURKS, MONGOLS, and TURANIANS.

TARTARY (properly TATARY) is the name under which, in the middle ages, was comprised the whole central belt of central Asia and eastern Europe, from the Sea of Japan to the Dnieper, including Manchuria, Mongolia, Chinese Turkestan, Independent Turkestan, the Kalmuck and Kirghiz steppes, and the old khanates of Kazan, Astrakhan, and the Crimea, and even the Cossack countries; and hence arose a distinction of Tartary into European and Asiatic. But latterly the name Tartary had a much more limited signification, including only Chinese Turkestan and Western Turkestan.

Tartarus, according to Homer, is a deep and sunless abyss, as far below Hades as earth is below heaven, and closed in by iron gates. Into Tartarus Zeus hurled those who rebelled against his authority, as Kronos and the Titans. Afterwards the name was employed sometimes as synonymous with Hades or the under-world generally, but more frequently for the place of damnation where the wicked were punished after death. See HELL.

Tartini, GUISEPPE, a celebrated Italian musician and composer, born at Pirano in Istria in 1692. At Padua he studied in the first instance for the church, and subsequently for the law, but gave up both for music and fencing. Having secretly married the niece of the Archbishop of Padua, he had to take refuge in a monastery at Assisi, where he became a proficient on the violin. In 1721 he was allowed to rejoin his wife, and return to Padua, where he was appointed solo violinist in the chapel of San Antonio—a highly honoured position, which, along with the fees from his pupils, secured him a fair income. He died in 1770, and a statue in his honour was erected in Padua. Tartini 'was one of the greatest violinists of all time, an eminent composer, and a scientific writer on musical physics.' His best-known work is the famous sonata, *Il Trillo del Diavolo*. He was the author of *A Treatise on Music*, and was the discoverer of the so-called grave harmonics, or third or combination sounds in sounding double stops.

Tartuffe, the name of the chief character in Molière's most celebrated comedy, which has become a synonym in all languages for a hypocritical pretender to religion. See MOLIÈRE.

Tarudant, capital of the Moorish province of Sus, on the Sus River, about 40 miles from the sea. Pop. 8500.

Tashkand, or TASHKENT, the capital of Russian Turkestan, stands 300 miles to the NE. of Samarcand, on a small river which empties itself into the Syr-Daria or Jaxartes. It consists of an ancient walled city and a new European quarter with broad streets bordered by canals and avenues of trees. The Russian citadel lies a little to the south. There are extensive military stores, official buildings, Russian schools of all grades, an observatory and geographical society, Russian and Kirghiz newspapers, and a brisk trade with Russia and other parts of central Asia. It is connected with the European system of telegraphs, and has manufactures of silk, leather, felt goods, and coarse porcelain. Pop. 100,000, including 80,000 Sarts (q.v.) and 15,000 Russians. Once capital of a separate khanate, Tashkand was in 1810 conquered by Khokand, and since 1868 has been Russian. See TURKESTAN.

Tasmania. The island of Tasmania is situated between 40° 33′ and 43° 39′ S. lat. and in 144° 39′—148° 23′ E. long.; corresponds nearly with southern France and northern Italy in the northern hemisphere; and occupies an area of 26,215 sq. m.—about that of Scotland. It is bounded on the N. by Bass Strait, while its other coasts are swept by the waters of the great Southern Ocean. It may be assumed with reasonable safety that Tasmania was at one, if a remote, period a constituent part of the continent of Australia. It is confirmatory of this that the great Cordillera range (as Sir Roderick Murchison termed it), which is traceable along the eastern border of Australia across Torres Straits to New Guinea, may similarly be traced across Bass Strait by the chain of islands (the Furneaux and Kent's group) which almost continuously links Tasmania with the nearest point of Australia.

Although it possesses wide stretches of comparatively level plains and tableland, the prevailing characteristics of Tasmania are those of a mountainous country. It has within its borders fifty mountains of heights from 2500 feet upwards, whereof the loftiest is Cradle Mountain (5069 feet); the higher tiers are snow-capped through the winter and suggestive of Switzerland or the Tyrol. Its streams (which are perennial) are as to their gravelly, boulder-strewn bed, their environments of hill and foliage—even as to their trout and salmon, as the rivers and burns of Scotland. The lakes, notably Lake St Clair, are suggestive of a Loch Katrine or Loch Lomond on a large scale. The lakes of Tasmania, hitherto neglected save by the very occasional tourist or angler, should in the course of time become summer-resorts and sanatoria for the whole people of Australasia. The Great Lake is about 90 miles in circumference. It is a peculiar feature of these lakes that they are found upon an elevated plateau averaging more than 3000 feet above sea-level. The extent of this plateau, from Dry's Bluff in the north-west to Denison Range in the south-west, is over 60 miles, while from Dry's Bluff two other plateaus branch (1) to Cradle Mountain, a distance of nearly 50 miles, and (2) to Table Mountain, over 43 miles.

Tasmania has many rivers, but of these only the Derwent, Tamar, Gordon, Pieman, and Huon are navigable for many miles from their mouths for ships of fair size. The Derwent is thus navigable for over 60 miles—i.e. 22 above Hobart, the capital; Launceston, the northern city, stands at the head of navigation on the Tamar.

Hobart is the principal harbour of Tasmania, and is second to none in the southern hemisphere. The Launceston port has been improved by dredging so as to admit of large ocean steamers mooring at its wharves. At Emu Bay harbourage for large vessels has been secured by a breakwater, and on that portion of the coast-line (the north-

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west), as well as on the east, north-east, and south coast, there are many harbours for small craft. The west coast has but one harbour worthy of the name—Macquarie Harbour, a noble sheet of water fed by the Gordon and other streams, but, like the river-ports of the north, a bar harbour, requiring an expenditure of some £180,000 in dredging the mouth, &c. before it will admit vessels of large tonnage.

The character of the soil varies very considerably. In the north-western, north-eastern, midland, and south-eastern divisions, where settlement has mostly taken place, the plains and valleys have been enriched by extensive outbursts of basalt with accompanying tuffs, which have produced a very rich chocolate soil. Here the associations are those of the ancient Tertiary lake systems. Towards the extreme west and south granites, metamorphic mica, and quartzose schists, with overlying slates, grits, and limestone of Cambro-Silurian age, reappear again and again in anticlinal and synclinal ridges which trend north and south. These rocks may also be seen following the south coast and evidently occupying nearly all that extensive mountain-region to the south of the river Huon.

The western vegetation as compared with that of the east presents as marked a contrast as do the prevailing rocks upon which it flourishes. The most remarkable trees are the Eucalypts. Many of these are known to exceed 280 feet in height, with a girth of from 40 to 50 feet, and one is mentioned whose height was estimated at 330 feet. Lady Franklin's tree, near Hobart, is stated to have a circumference of 107 feet at a height of 4 feet from the ground. These Eucalypts have a substantial value as timber-trees, and a considerable trade is done in the hard-wood boards, palings, &c. sawn or split from them. But the most valuable trees are the blackwood, Huon pine, King William pine, and musk, all of which furnish highly ornamental woods that are beginning to make their way in the English market. The most picturesque trees of a Tasmanian landscape are the magnificent tree-ferns that lend the glories of tropical foliage to many a stream and gully, and the wattle, with its delicate and fragrant mimosa-like bloom. It is worthy of note that all Tasmanian trees and shrubs are evergreens.

The *fauna*, like the *flora*, of Tasmania is almost identical with that of Australia. Of the forty-six species of terrestrial mammals inhabiting the island two belong to the Monotremata, of which order the platypus or ornithorhynchus is the most remarkable. There are twenty-seven representatives of the Marsupialia or pouched animals, nine of which are peculiar to Tasmania, the most remarkable of these being the Tasmanian devil (see DASYURE) and the hyæna-like native tiger (see THYLACINE). The bats have four representatives. Of rodents there are thirteen, of which the most conspicuous is the common water-rat or yellow-bellied musk-rat (*Hydromys chrysogaster*). Comparatively few birds are peculiar to the colony, though there are in all 187 indigenous species. For the sportsman there are four varieties of quail, four of pigeons, nine of snipe and curlew, ten of plovers, and twelve of black swans, Cape Barren geese, and wild duck. For the epicure there is the wattle-bird (family Melyphagidæ). Reptiles are few and not of a deadly character. There are three snakes: the tiger or banded snake (*Hoplocephalus curtus*), the copper-headed snake (*H. superbus*), and the whip-snake (*H. coronoides*). All these are in a greater or less degree poisonous, and human beings are occasionally bitten, but the death of a human being from snake-bite has not occurred for many years. There are seventeen species of lizards, all small and harmless; and at rare intervals a small scorpion (probably just imported) is met with. Sea and fresh-water fishes (including the seven species of salmon, salmon-trout, and trout brought from the United Kingdom and successfully acclimatised) number 213 species, about one-third of which are good edible fish. It is known that large shoals of sand smelts, sprats, and anchovies appear upon the coasts at regular seasons, but because of the lack of proper appliances to catch them, these escape capture. And, in the absence of proper curing establishments, large quantities of such fish as are caught have been wasted at times, although there has been, and is, a ready market for them in Australia, the trumpeter and other fishes of the Tasmanian waters being unknown in the warmer regions of the north.

Natives (in the sense of aborigines of Tasmania) there are none. There are a few half-castes, the descendants of European sealers by native *gins*, and these are found with one exception on the islands of Bass Strait; but the aboriginal Tasmanian has died out—the last male in 1869, the last female in 1876. It is probable that there were never more than 5000 of these people. It is certain that they were a very inferior race, and it was a logical, if cruel, consequence of their contact with Europeans that they should disappear off the earth. That they were inferior even to the low order of humanity found on the mainland is proved by the comparative poorness of their resources for sustaining existence; the Tasmanian was as far behind the Pacific Islanders in regard to civilisation as those islanders are behind the European of the 19th century. The Tasmanian was a savage, suspicious, treacherous, and untamable. He first came into collision with the early French explorers. Blood continued to flow during the racial war waged between the natives and the early British settlers. But this was not quite a war of extermination; in 1830 an effort was made to save the race; the remainder of them were induced to come into a settlement where they were carefully provided for, with the untoward result that slowly but surely this remnant of a people died out.

The climate is peculiarly temperate and genial. The difference between the mean temperature of summer and winter is 15°. The meteorological observations of Hobart give a maximum of 96·3 against 92·2 recorded at Greenwich, and a minimum of 32·0 against 15·5. It is cooler on the hills, and it is more equable at other places in the plains, notably at Circular Head, where the maximum has never risen above 78° or the minimum fallen below 34°. Snow is very rarely seen except on the mountains. The rainfall varies considerably in different localities. A mean of thirty-five to forty years gives as the result for Hobart 22·93 inches; on the east coast and some parts of the midlands it is probably less; on the north-west and north-east, where timber-clad hills more abound, it is greater; and on the west coast, where the prevailing wind off the Southern Ocean meets a barrier of ranges often clothed with forest to their summits, it is greatest of all. The average for the island as a whole may be put down at something like that of England; but the amount of sunshine recorded in Tasmania is very materially in excess of that of Great Britain. The air is drier, the atmosphere clearer, and the extremes of heat and cold less trying than in the mother-country.

Tasmania was discovered in 1642 by Abel Jans Tasman (*c.* 1602–59), who was despatched by Antony Van Diemen (1593–1645), governor-general of the Dutch settlement in Batavia, on an expedition in search of the 'Great South Land.' Until 1798 it was regarded as a portion of New Holland (or Australia): but in that year Lieutenant Flinders and

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Dr Bass explored the strait which divides the continent from Tasmania, and which was named after the adventurous doctor. Curiously enough, while the early explorers ignored this dividing strip of water, they imagined a north and south dividing stream which cut Australia into sections, and it was over the portion to the east of this imaginary stream that Holland for some years boasted of a shadowy sovereignty.

Subsequent to the discovery of 1642 Tasmania was visited by French and English explorers in 1772, 1773, 1777 (Captain Cook's third and last expedition), 1789, 1792 (when Lieutenant Bligh, notorious for the mutiny of his crew, paid his second visit), 1793, 1794, 1798, and 1802. On the 12th September 1803 the first settlement was made by Lieutenant Bowen, acting under instructions from Governor King of New South Wales. Tasmania was the second colony founded in Australasia, that of New South Wales (or Port Jackson) having been founded fourteen years before. The first settlement in Victoria was made by Tasmanian colonists in 1834–37, and Tasmania may therefore claim the honour of being the mother of Victoria. For many years sheep-farming was the principal industry. The merino stud-sheep, for which the colony is now renowned, are possibly the direct descendants of the lambs, originally drawn from the royal stud at Kew, imported in 1820. These sheep have been exported to other colonies continuously for many years, and with a value for one year of £66,743; and as much as 1125 guineas has been realised as the price of one ram.

Whaling in the south seas was largely carried on from Hobart for some years. In 1848 thirty-eight whalers sailed from Hobart, and in 1869 twenty-three; but by 1891 Hobart's whalers had dwindled down to two, though whales in that southern region have not died out.

While Tasmania has made relatively immense strides since 1860 as an agricultural colony, the industry that has most stimulated the hope of her people is mining. From shore to shore gold, silver, tin, copper, coal, and many other minerals are found, sometimes in wide-spread fields, at other times in more restricted areas. Gold-mining companies now number ninety (exclusive of alluvial mining). Tin-mining companies are sixty-two in number, and silver companies over 320; and the tapping of the numerous and very rich silver-mines of Mounts Zeehan and Dundas by the railway from the port of Strahan (completed in 1890) was expected to double or treble the output of mineral wealth. Tasmania now supplies all her coal requirements from local sources, and since 1882 has a large surplus for export. Gold in any quantity was only obtained in 1867, and tin, first discovered in 1871, was not found in quantity for export until 1874. Sapphires of large size (up to 320 carats) and excellent quality, together with topazes, cat's-eyes, and zircons, are now being mined with success on the Blue Tier.

Another industry that has been largely developed is fruit-growing; orchards have increased in area from 6717 acres in 1881–82 to 10,345 acres in 1890–91. In 1889 Tasmanian apples were first sent in quantity to England in the cool chambers of the mail-steamers: 30,000 bushels were sent in that year, 40,000 in 1890, 140,000 in 1891, and 240,000 in 1892.

Tasmania (as Van Diemen's Land) was originally a penal settlement. In 1852 transportation to this colony was abolished; and now all traces of the convict element have died out. In 1855 Tasmania was the first colony of Australasia to receive the privileges of local representative government. The population in 1881 was 115,705; in 1891 it had increased (by 27 per cent.) to 146,667. In 1871 there was no railway in Tasmania; in 1891 there were ten government lines completed aggregating 472 miles, and two private lines aggregating 49 miles. Telegraph offices in 1871 were fourteen, with 241 miles of wire; in 1890 there were 194 offices, and 2701 miles of wire. Government schools increased from 130 in 1871 to 240 in 1890. Further increases are tabulated as follows:

	1871.	1890.
Revenue	£271,928	£758,100
Expenditure	287,202	722,746
Bank deposits	658,099	4,158,708
Savings-bank deposits	217,413	521,250
Imports	778,087	1,897,512
Exports	740,638	1,456,992
Shipping—		
Inwards, tonnage	107,271	475,618
Outwards, "	108,889	475,629
Acres in cultivation	340,451	517,174
Horses	23,054	31,165
Cattle	101,540	162,440
Sheep	1,305,489	1,619,256
Pigs	52,863	81,716
Roads	2,916 miles.	5,659 miles.

Public Debt.—In 1871 the public debt was £1,315,200, and in 1890 £6,432,800 (including £1,106,500 paid for the Tasmanian Main Line Railway Company's line, which was guaranteed by the state to the extent of £32,500 per annum).

See, besides official statistics and parliamentary papers, James Bonwick, *The Lost Tasmanian Race* (1884); Jas. Fenton, *History of Tasmania* (1885); W. T. May, *Tasmania as It Is* (1886); R. M. Johnston, *Geology of Tasmania* (Hobart, 1888); H. Ling Roth, *The Aborigines of Tasmania* (1890); Louisa A. Meredith, *Last Series of Bush Friends* (Flowers, Fruits, and Insects) *in Tasmania* (1891); Crozet's *Voyage to Tasmania, New Zealand, &c. in 1771–72* (trans. by H. Ling Roth, 1891).
For map, see SOUTH AUSTRALIA.

Tasmanian Devil. See DASYURE.

Tasman Sea, the name accepted by the Admiralty in 1891 for the sea between New Zealand, the islands to the north-west of New Zealand on the one hand, and Australia and Tasmania on the other.

Tassie, JAMES (1735–99). See GEM.

Tassisudon, the capital of Bhutan (q.v.).

Tasso, BERNARDO, now chiefly remembered as the father of the great Torquato, was, however, held in high esteem as a poet in his own day. Born at Venice in 1493, he belonged to an illustrious family of Bergamo, who had held the administration of the posts in Italy and other countries, and hence show in their armorial bearings a post-horn and the skin of a badger (*tasso*), of which fur the post-horses' frontlets were made. Bernardo, left an orphan, studied at Padua, where he gained the friendship of the famous Cardinal Bembo, the then oracle of literary taste, and, becoming secretary of Guido Rangone, was sent to France (1528). Here he entered the service of Renée, daughter of Louis XII. of France, wife of Ercole II. d'Este, reigning Duke of Ferrara, and mother of the Alfonso and Leonora d'Este whose influence was to be so great on the future destiny of Bernardo's famous son. A few years later we find him in the service of Sanseverino, prince of Salerno, whom he followed in many travels, joining with him the expedition of the emperor, Charles V., against the Tunisian pirates in 1535, and visiting Spain, Flanders, and France a second time.

Bernardo's literary productions had been chiefly lyrical, of the bombastical and hyperbolic type affected by the imitators of Petrarch; he had followed the movement made at this time to adapt Italian verse to Latin metrical forms. Sanseverino settled on him a pension and allowed him to retire to Sorrento, there to dedicate himself to the composition of an epic poem, the subject

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of which was the Amadis of Gaul and his adventures, as described in the admired Spanish romance by Ordonez de Montalvo (published about 1492). Bernardo married, probably in 1536, Porzia de' Rossi, belonging to a noble family from Pistoja in Tuscany. In 1537 a daughter, Cornelia, was born to them, and in 1544 their only son, Torquato, the future great poet. Bernardo and his wife lived in perfect peace and unity, until in 1547 their prosperity came to a sudden end. Their protector Sanseverino resisted the attempt of the imperial viceroy to establish the Inquisition in Naples, fell into disfavour with the emperor, Charles V., and, joining the French king, was outlawed and had his estates confiscated. Poor Bernardo, who had followed his patron, was included in the same sentence. His wife and children took refuge in Naples with relatives; his little son was sent to him in Rome in 1554. For some years Bernardo led a wretched life there, still more embittered by the loss of his beloved wife, who died in sorrow and poverty in Naples, 1556. He found a refuge later at the court of Urbino, where he finished his epic, *L'Amadigi*. Bernardo went to Venice to superintend the publication of his great work (4to, 1560), but it did not bring him the fame he had hoped. The last years of Bernardo's life were passed in the service of Duke Guglielmo Gonzaga of Mantua, who made him podesta of Ostiglia. Here, on the 4th September 1569, he ended his long and troubled career, breathing his last in the arms of his beloved son. Bernardo's chief work, *L'Amadigi*, is now entirely forgotten; it is one of the many imitations of Ariosto's romantic epic, but exaggerated and inflated in style and unreal in sentiment; the verse, however, is skilful and melodious. He began another epic, *Floridante*, finished by his son, and published (1587, 4to). Besides his numerous lyrics (2 vols. 1749) he has left a copious and interesting correspondence (1733–51).

See the more recent *Lettere di Bernardo Tasso*, edited with biography by G. Campori (Bologna, 1869), and, for details of his later years, *Lettere inedite* (published by Portioli, Mantua, 1871).

Tasso, TORQUATO, son of the preceding, was born at Sorrento, near Naples, 11th March 1544. He was one of the greatest of Italian poets, though belonging to a time of decadence, to that later 16th century which saw the decline of art and literature, and religious and political liberty in the peninsula crushed under the power and bigotry of Spain. After his father was exiled Torquato lived with his mother, the exemplary Porzia de' Rossi, in Naples, and received his earliest instruction at the Jesuit school there. In 1554 he joined his father in Rome, never again seeing his unfortunate mother, who died, broken-hearted, two years later.

He showed great precocity in his studies, read Latin and Greek fluently at an early age, and composed with ease both prose and verse in Italian. He shared his exiled father's wandering life; increasing his store of learning under his careful supervision at Pesaro, Urbino, and Venice. In 1560 Tasso was sent to study law and philosophy at Padua, and while there composed and published his first work, a romantic poem in twelve cantos, *Rinaldo*, which he dedicated to the Cardinal Luigi d'Este. In 1565 Tasso entered the service of this cardinal, and by him was introduced to the splendid court of his brother, Alfonso II. d'Este, reigning Duke of Ferrara. The youthful poet was appreciated and encouraged by the sisters of the duke—Lucrezia, afterwards Duchess of Urbino, and Leonora—two princesses renowned even amongst the cultured women of that day for their many brilliant gifts. Amid such congenial surroundings Tasso began his great epic poem and masterpiece, *La Gerusalemme Liberata*.

In 1571 he accompanied the Cardinal d'Este to France, and was received with favour by Charles IX. and his mother, Catharine de' Medici; and he was warmly welcomed by his brother-poets, chief amongst whom was Ronsard. On his return to Italy in the following year Tasso became definitely attached to the service of Duke Alfonso at Ferrara. This court had been the scene of the earliest revival of the profane drama in Italy towards the end of the 15th century, and it was for this celebrated stage that Tasso wrote in 1573 his beautiful pastoral play, *Aminta* (1581). The perfection of its style, moulded on classic models, and the melody of its verse won for this exquisite dramatic poem a wide popularity and many imitators. Tasso completed his great epic in 1575, and (like his father before him) submitted it before publication to the judgment of the distinguished savants and critics of the day. Their fault-finding (sometimes just, but pedantic and mixed with religious scruples) and Tasso's replies (never rebellious, and generally yielding, though always full of judgment and fine literary taste) are all recorded in his correspondence and in his *Apologia* of the poem. These conflicting considerations and discussions coming after his long poetical labours seem to have unhinged his sensitive and highly-strung mind, and in 1576 he showed the first signs of the mental disorder which darkened all his later days. He became suspicious, melancholy, and particularly oppressed by the idea that he had offended against the church and been denounced to the Inquisition. On the 18th June 1577 Maffeo Veniero writes to the Grand-duke of Tuscany: 'Of Tasso I give you news that yesterday evening he was imprisoned for having, in the chamber of the Duchess of Urbino, drawn his knife on a serving-man, but he was arrested rather because of his disorder and to cure it than as a punishment. He is of a strange humour, believing himself to have sinned as a heretic, and also has the fear of being poisoned.' After this outbreak the succeeding years of his life are one long chronicle of mental struggles and sufferings of every kind. His first confinement lasted only a few days, and he shortly afterwards fled from Ferrara. Wandering through Italy on foot, he made his way to Naples, where he was affectionately cared for by his sister, Cornelia; but even here he found no rest. He travelled to Rome, and northwards through the principal towns until he reached Turin, on foot and so poorly accoutred and strange in appearance that the guards refused him admittance until recognised by a former friend as the great poet. He was then honourably entertained by the Duke Carlo Emanuele of Savoy. His great longing was to return to Ferrara, the scene of his early triumphs and brightest memories, and in 1579 he seized the occasion of Duke Alfonso's second marriage to present himself anew at that court. He met with a cold reception, and deeply wounded by some real or imagined slight he broke in public into furious invectives against the duke, his courtiers, and all the world. On the 15th March of the same year he was confined by order of the duke in the hospital of St Anna in Ferrara, and there he remained a prisoner for seven years. During these miserable years he produced many noble verses and philosophical dialogues, and a vigorous defence of his *Jerusalem*, the publication of which, without his leave and with many errors, had sorely grieved him. His many piteous letters of appeal to his friends and patrons, from the pope downwards, for release from prison give a most complete and heart-rending picture of his sufferings at this time. The sad figure of the good, gentle, and great poet in a madhouse, while his famous epic was

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delighting Italy and all Europe, is one of the most pathetic in literary history, and one which may well interest posterity, even without the romance of his supposed passion for the Princess Leonora, a passion so often alluded to by later poets (especially Goethe, Goldoni, and Byron). There seems to be no positive proof that the unhappy poet nourished any other sentiment for the princess than that of the respectful devotion, admiration, and gratitude natural towards such a patroness. Certainly no manifestation of presumptuous love for the princess was the cause of his imprisonment; all contemporary accounts of his state point to his insanity, bearing the character of religious mania. But doubtless whatever may have been the nature of his feelings to Leonora her death in 1581 must have been a new grief to him. During her fatal illness Tasso writes from prison to her chaplain: 'If my Lady Leonora is better, as it comforts me to believe, and I greatly desire, humbly kiss her hands in my name, most reverend father, letting her know that I have grieved much for her illness, the which I have not bewailed in verse, because of I know not what tacit repugnance of my mind.'

Duke Alfonso had been repeatedly petitioned to set Tasso free. The cruel contrast between his fate and the daily growing fame of his great poem (which had been reprinted six times in a few months) had greatly excited popular interest. At length in July 1586, by the intercession of the Prince Vincenzo Gonzaga, Tasso was liberated, and at once left Ferrara, never to return. He followed his new patron to Mantua, where he remained a year, and where he wrote a tragedy, *Torrismondo*, his only and not very successful effort of that kind. Broken in health and spirits, he began again his restless wanderings from town to town, spending, however, most of these later years in Rome and Naples, where he tried in vain to recover from his mother's relatives some part of her inheritance, or from the government his father's confiscated estates. He was, however, helped and protected by many kind friends and patrons eager to show honour to so great and unfortunate a genius. He busied himself in rewriting his great epic, according to the modifications proposed by his numerous critics; he tried to observe more strictly the classic unities and historical accuracy, to remove profane episodes and to treat more of religion and theology. The result, a poor spectre of his living masterpiece, even the style and verse being inferior, was published under the name *Gerusalemme Conquistata* (Rome, 1593, in 4to), and dedicated to Tasso's latest patron, Cardinal Cinzio Aldobrandini, nephew of Pope Clement VIII. By this pope he was summoned to Rome to be crowned on the Capitol as poet-laureate, like Petrarch. The ceremony, however, never took place, for on Tasso's arrival in the papal city his already weakened health became worse, and he retired to the care of the monks of Sant' Onofrio, a quiet convent on the Janiculum, where, resigned and peaceful, he breathed his last on the 25th April 1595.

Tasso, although not the last great poet that Italy has produced, is certainly the last whose influence made itself felt throughout Europe, and his *Jerusalem* is the culminating poetical product of his age, as Dante's *Divine Comedy* and Ariosto's *Orlando* are of the two preceding centuries. In our own literature we find traces of his influence notably in Milton. His great poem is, like himself, a typical product of his time, with its blind idolatry of classic forms conflicting with newly-revived religious superstition and bigotry, but exempt from the current defects of hypocrisy, affectation, and licentiousness. As Settembrini says: 'One thing Tasso had, which few in his time possessed, a great heart, and that made of him a true and great poet, and a most unhappy man.' The sincere fervour of his piety and purity of his life are testified by his own writings and by his contemporaries. Tasso's intention was to create in his *Jerusalem* a great religious epic, his theme was to be the triumph of the warriors of the Cross in the first Crusade, and his hero was to be Godfrey of Bouillon, their commander, his material to be taken from *Historia belli sacri verissima*, by Tyrius (Basel, 1559–64). With the history of his nominal hero the poet has entwined fictitious characters and episodes, and it is these creations which give vitality to his work. The melodious verses, in which he has sung the loves of the fair Erminia and the warlike Clorinda and the beauty and wiles of the enchantress Armida, still live on the lips of the Italian people—verses whose authorship seemed to the diseased conscience of poor Tasso a sin to be repented.

Tasso's earliest biographer was his personal friend, the Neapolitan G. Manzo, the same Manzo whom Milton visited in Naples, and to whom he dedicated a Latin poem. This friend thus describes Tasso's appearance (*Vita di T. Tasso*, 1619): 'He was of tall stature and well proportioned, his complexion of perfect whiteness, the colour of his thick hair and beard between dark and fair, his head large, his forehead square, his eyebrows and lashes black, his eyes large and blue, his nose aquiline, his lips thin and pale, and his limbs so agile that he yielded to none in fencing, riding, and jousting.' More complete than any biography is the picture which is given of his outer and inner life in his copious correspondence in his dialogues and various prose-works, where he reveals himself as a most facile and eloquent prose-writer.

Among Tasso's many commentators and critics we find his great contemporary, Galileo (see the *Scritti di Critica litteraria di Galileo*, Turin, 1889). The earliest complete edition of the *Gerusalemme Liberata* is that of Bonna (Ferrara, 1581, 4to); the best modern reprints are those at Modena (1868) and at Florence (1889). Translations of the *Jerusalem* have been made into many languages; in English the most famous is that of Fairfax (1600; new ed. by H. Morley, 1891); others are by Bent, Broadhead, Robertson, Smith, Wiffen, and Sir J. K. James (1868; new ed. 1884). The most complete biography is the *Vita di Tasso*, by Serassi (Rome, 1783, 4to; reprinted Florence, 1858); more recent is *Studii su T. Tasso*, by Ferrazzi Bassano (1880). See also Tasso's letters and prose writings (edited by Guasti, 1854–57); D'Ovidio, *Saggi Critici* (1879), and Corradi, *L'Infermita di Tasso* (1881); *Letteratura Italiana*, by Settembrini (Naples, 1887); *Cours de Littérature de Lamartine* (1863); *Life of Tasso*, by Black (Edin. 1810); *Life of T. Tasso*, by Dean Milman (Lond. 1850, somewhat antiquated); and Miss E. J. Hasell, *Tasso* (Foreign Classics series, 1882).

Taste, one of the special senses (see SENSATION). The parts of the mouth affected by sapid substances are the surface and sides of the tongue, the roof of the mouth, and the entrance to the pharynx. The mucous membrane is invested by stratified squamous epithelium, which, over the surface of the tongue, covers little vascular projections termed papillæ. One can see the papillæ of the sides and upper part of the tongue with the naked eye, as little sharp or rounded projections; the latter, thickly clustered at the tip and sides, may appear, if the system is out of order, as little red points like those of a strawberry. In the cat tribe the papillæ are hard and curved backwards into the mouth, so that the animal can use the tongue as a scraper to remove the flesh from the bones of its prey. The pointed papillæ are termed 'filiform,' and one is repre-

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sented in fig. 1, while a rounded papilla is seen in fig. 2. They are essentially the same in structure, differing alone in shape and size, and, were the figures drawn to some common scale, fig. 2 would have to be three or four times as big as it is. At the back of the tongue are some eight or ten papillæ of quite a different nature, called 'circumvallate.' They are arranged to form a V

Fig. 1.
A Filiform Compound Papilla, magnified 300 diameters:
a, artery; *v*, vein; *c*, capillary loop; *e*, epithelium; *f*, hair-like processes at the apex.

with its angle pointing backwards. These are hardly papillæ at all, but may be looked upon rather as tiny patches of mucous membrane trenched out from the surrounding parts. Into these trenches Ebner's glands secrete a watery albuminous fluid, keeping them perpetually moist and free from foreign particles. In the epithelium lining these trenches curious little bodies called taste-bulbs are lodged; and, as these are the parts which are probably more especially concerned in taste, they must be carefully described. Each taste-bulb looks like a flask-shaped barrel or box, the walls of which are composed (fig. 4) of flat elongated epithelial cells fitted side by side like the staves of a cask.

Fig. 2.—A Fungiform Papilla, with the capillary loop of its simple Papillæ injected:
a, artery; *v*, vein. Around the base there is often a groove, which is here shown; as also the capillary loops, *c*, *c*, of two of the neighbouring simple papillæ (magnified 18 diameters).

The taste-bulbs open each by a little pore into the trench, and into the deeper part a nerve enters in the way represented in fig. 3. The cask is probably for the protection of the sensory cells which it contains, and one of which is drawn in *d*, fig. 4. These cells are much elongated, and end each in a tiny bristle which projects with those of their companion cells from the little pore into the trench, and is here moistened by the juice of Ebner's gland and whatever sapid substance may be present. The impressions which these sensory cells receive from the bristles, say by the action of a bitter like 'hops,' is carried by the delicate nerve which starts from the opposite end of the cell out of the taste-bulb directly to the brain. Within each taste-bulb are other cells (*e*, fig. 4), which separate and support the sensitive cells, and are similar to analogous structures seen in the sensory epithelium of the eye, and nose, and ear. While it is almost certain that these taste-bulbs are organs of taste, it is not equally certain that other parts are not involved. The reason for this belief is that in the front and sides of the tongue these taste-bulbs are few in number, while in these regions taste sensations are pretty acute. It is therefore not improbable that the nerves which abundantly pass into the epithelium of the tongue end in other ways, but unfortunately we are at present much in the dark concerning their exact method of termination. It is to be noted that the protective layer of the mucous membrane is thin, and might conceivably be permeated readily by the juices of the mouth, which would reach the lower cells into which some of the nerves certainly pass. From the mucous membrane of the mouth the impressions produced by sapid substances are carried probably by fibres belonging to the fifth nerve. These fibres, although they belong to this nerve, are found to run in the greater part of their course in other nerve trunks—viz. the glosso-pharyngeal, to the back of the mouth and tongue, and the chorda tympani to the front of the tongue.

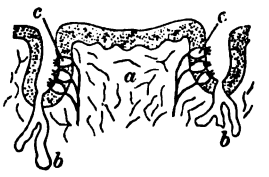

Fig. 3.—A Semi-diagrammatic View of a Circumvallate Papilla:
a, body of papilla; *b*, Ebner's glands opening into the bottom of the trench; *c*, taste-bulbs with the taste nerves leaving them.

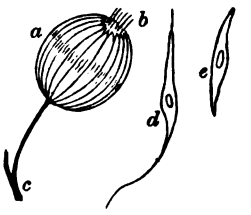

Fig. 4.
a, taste-bulb with stave-like epithelial jacket out of the opening of which the sensory hairs (*b*) project; *c*, the nerve passing to taste-bulb; *d*, a sensory cell taken from a taste-bulb, showing the sensory hair and its fine nerve; *e*, a supporting cell.

Having sketched the mechanism concerned in the production of taste sensations, we can now turn to the discussion of the many interesting facts which may be observed when this mechanism is called into play. In the first place, it may be remarked that substances capable of dissolving in the juices of the mouth are alone tasted. Marble, wood, flint, are devoid of taste, and so is pure starch; these are all of them quite insoluble in water. By the aid of various means we can convert the last-named substance into a very soluble 'dextrine,' yet this is tasteless. Another chemical product of the starch is a soluble substance termed 'dextrose,' which has a sweet taste and is commonly termed 'grape-sugar.' These examples will serve to illustrate the general fact that substances to be tasted must be in solution, though not all soluble substances are capable of giving rise to this sensation. It is a matter of general experience

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that, if a substance like sugar be simply placed in the mouth and allowed to dissolve, its taste is only faintly evident. If, however, the juices of the mouth, sweetened by the sugar, be rubbed into the mucous membrane by moving the tongue against the palate, the sensation is greatly intensified. One invariably 'smacks the lips' in trying to appreciate the qualities of a taste, and obtains in this way its maximum effect.

A fact that is hardly known by the laity is that most of the so-called tastes are really 'smells.' Sugar, salt, quinine, and some acids are devoid of smell; we could not distinguish them except by the tongue itself, and we have in these the prime taste sensations of sweet, salt, bitter, and acid. Meat, wines, and fruit are smelt, not tasted, and a bad cold dulls our appreciation of these articles of diet. To the prime taste sensations already mentioned may be added perhaps alkaline, astringent, and metallic tastes, but when all is told this organ yields us rough results when compared with smell, sight, or hearing, whereby hundreds and thousands of shades of quality are readily perceived in the odour of flowers, the lights from coloured objects, and the sounds from an orchestra. The various taste sensations are not equally produced on stimulating the whole of the gustatory area, and indeed each taste seems to have some special locality at which it is most acutely felt. If we take a piece of quassia or a hop-leaf and chew it, we shall at first be unconscious of taste, and it is only when the juice of the mouth laden with these bitter principles passes to the back of the mouth that the taste is felt at all. This is why we drink beer in the draught, and do not sip it like wine. The sweet or acid wine is tasted best by the front part of the tongue, while the bitter beer is only appreciated as it is going down the throat. As in the other senses, anything that stimulates the gustatory nerve gives rise to a sensation; and although sapid particles effect this best of all, electrical or even mechanical stimuli have some effect. If we place a piece of zinc and copper on the tongue, and join them so as to give rise to a feeble current, or still better, if a slight interrupted electrical current be passed through the mucous membrane of the tongue, metallic saline tastes are produced. These are possibly due to electrolytic changes and not to direct stimulation, though this is less likely to be the case with the induced currents, equally powerful in the production of sensation. It is often stated that a sharp tap on the tongue produces a sweet or saline taste; this is, however, an experiment which often fails. If we rub the back and side of the tongue with the finger tip we shall hardly fail to notice a bitter taste, and it is probable that we shall question the cleanliness of the finger used. A scrupulously cleaned glass rod gives rise, however, in equal measure to the same sensation, and we are forced to conclude that the mechanical stimulus of the rod calls forth that taste which has its seat in the back of the mouth and tongue.

Our knowledge of what really takes place when an external agency affects the senses, sets up a nerve-motion which travels to the brain and there induces a sensation, is very limited. Perhaps in the case of hearing our knowledge is most precise, and there are grounds for believing that the sound-waves mechanically set in motion appropriate structures within the ear, just as a note sung before the piano will cause certain of its strings to vibrate. The light affects the eye in a manner at which we are at present only guessing; but it can be said that our different colour sensations depend upon the stimulation of the retina by ether vibrations of different pitch and complexity. In this respect then sight and hearing are both alike, and we have outside the body media capable of vibrating at different periods, and the kind of vibration determines the kind of sensation produced. As to taste and smell, until lately nothing whatever was known which would explain in any rational way their production. When Newlands, Lothar Meyer, and Mendeleëff discovered what is termed the Periodic Law in chemistry, it occurred to the author of this article to see if this law holds good for taste and smell; this was found to be the case (see *Proceedings* of the Royal Society of Edinburgh, 1885–86; and *Brain*, 1886). Newlands found that if we arrange the elements in a series, beginning with that one which has the lowest and passing to that which has the highest atomic weight, a periodic recurrence of function or property is found. There is a general resemblance in physical properties between the first, eighth, fifteenth, &c., and between the second, ninth, sixteenth, &c. Those elements picked out of the series from their resemblance and periodic recurrence Mendeleëff arranged in groups (see ATOMIC THEORY), and the author found that similar compounds of these elements have similar tastes. To take an example (group 1), the chlorides of lithium, sodium, potassium, rubidium, cæsium are all salt, while the sulphates of these elements are all saline bitters. It is evident that this group of elements, similar in their physical properties, can also produce similar tastes, and we can correlate taste a physiological effect with some common physical quality.

Carnelly has shown that salts of elements belonging to the same group, if coloured, have colours which are related in this respect, that as we ascend the group the colour always approaches more and more to the red end of the spectrum. This, as it is unnecessary to point out, indicates molecular vibration of similar and related pitch, and in this case, alike in taste, smell, hearing, and sight, we have this common fact, that the stimulus is vibratory, and associated with the kind of this vibration is the quality or kind of sensation produced. Another very curious point is that, as in the case of hearing and smell, both very high and very low vibrations are unfelt. Bodies like albumen and starch are devoid of taste, even when converted into very soluble peptone and dextrine. When these molecules are broken up, then sapid substances may be produced such as sugar. Substances such as water and watery solutions of gases, like high-pitched notes or the ultra-violet rays of the spectrum, are incapable of producing sensations, and sulphuretted hydrogen on the border-land has a faint acid taste. Like smell, the sense of taste is placed at the entrance of the alimentary canal, and affords us knowledge of the nature of the food about to be eaten. We have so far adapted ourselves to our environments that, as a rule, those substances which please these senses are salutary foods, and the converse is equally true. This is, however, a rule with many exceptions, and it is perhaps one of the most anxious parts of a child's training, that of teaching by the eye those natural products which are injurious or even of a poisonous nature.

Tatars. See TARTARS.

Tate, NAHUM, was son of Faithful Tate, D.D., and was born in Dublin in 1652. He had his education at Trinity College, Dublin, succeeded Shadwell as poet-laureate in 1690, is described by Oldys as 'a free, good-natured, fuddling companion,' and died August 12, 1715, in the precincts of the Mint at Southwark, then a sanctuary for debtors. His writings include ten dramatic pieces, including an adaptation of *King Lear; Panacea, or a Poem on Tea;* various birthday odes, and an elegy on the death of Queen Mary; *Miscellanea*

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Sacra; the *Innocent Epicure, or Art of Angling*. But his name alone survives from the metrical version of the Psalms, which he executed in conjunction with Nicholas Brady (q.v.). The whole was completed as early as 1696, and slowly made its way into general use in the Church of England, supplanting the older version made in the reign of Edward VI. by Sternhold (q.v.) and Hopkins. The work as a whole was poor, but portions are not without poetic quality. The *Supplement to the New Version* (1703) was most probably the work of Tate alone; one thing in it, 'While shepherds watched,' has travelled over the Christian world.

Tati. See MATABELELAND.

Tatian, a Christian apologist born early in the 2d century (110, Zahn), was an Assyrian by birth, studied Greek philosophy, and wandered as a sophist round the Roman world, but about 150 at Rome was won to Christianity by the simple charm of the Old Testament Scriptures and the example of the purity and courage of the Christians. He became a disciple of Justin, in whose lifetime he wrote his *Oratio ad Græcos* (ed. by Otto, Jena, 1851; by Schwartz, Leip. 1888), a glowing and uncompromising exposure of the faults of heathenism as compared with the new 'barbarian philosophy.' After Justin's death (166) Tatian fell into evil repute for heresies, and he retired to Mesopotamia, probably Edessa, writing with characteristic fearlessness and vigour treatise after treatise, all of which have perished. He was certainly infected with Gnostic notions of the universe, the supreme God, the demiurge, and the world of æons; but the notions of his which gave most offence were his excessive asceticism, his rejection of marriage and animal food, and adoption of the practices of the Encratites. His name became a synonym for all manner of dangerous and unsettling tendencies, and his doctrines were assailed in turn by Irenæus, Tertullian, Hippolytus, Clement of Alexandria, and Origen. Neither the place nor date of his death are known, but it took place perhaps at Edessa, and probably about 180. Of his writings one maintained a place of importance in the Syrian Church for two hundred years, and supplies one of the most interesting chapters in the history of sacred literature. This was the *Diatessaron*, a gospel freely constructed out of the four gospels known to us, not a harmony in the modern sense, but a kind of patchwork gospel, its principle *amalgamation* not *comparison* in Lightfoot's phrase. This Harnack thinks was written in Greek, but Zahn and most other scholars, among them Lagarde, Bäthgen, Lightfoot, and Hilgenfeld, in Syriac. There is no mention of the *Diatessaron* in any Latin writer before the middle of the 6th century, when Victor of Capua attributes an anonymous gospel harmony he had found to Tatian, neither Cassiodorus, Gelasius, Jerome, Augustine, or Juvencus so much as naming it. Of Greek writers the first to mention it is Eusebius: 'Tatian composed a sort of connexion and compilation, I know not how, of the gospels: and called it τὸ διὰ τεσσάρων. This work is current in some quarters even to the present day.' Zahn thinks from this that Eusebius had never himself seen it, but, knowing Tatian to have been a heretic, thought his compilation a mere distorted gospel like that of Marcion and Gnostic teachers. Epiphanius says, 'the Diatessaron gospel is said to have been composed by him [Tatian]. It is called by some the gospel according to the Hebrews.' But on Syrian soil in Theodoret, bishop of Cyrrhus, near the Euphrates, we first find (453) an explicit account of the book: 'He [Tatian] composed the gospel which is called *Diatessaron*, cutting out the genealogies and such other passages as show the Lord to have been born of the seed of David after the flesh. This work was in use not only among persons belonging to his sect, but also among those who follow the apostolic doctrine, as they did not perceive the mischief of the composition, but used the book in all simplicity on account of its brevity. And I myself found more than two hundred such copies held in respect in the churches in our parts. All these I collected and put away, and I replaced them by the gospels of the four evangelists.' Thus we see that in the 5th century this work was used in the Syrian churches as the form in which the gospel was read, and further back still we find evidence of its use in the 3d-century *Doctrine of Addai* (Cureton's *Ancient Syriac Documents*, 1864, and G. Phillips, Syr. and Eng. ed. 1876), and in the *Homilies* of Aphraates (fl. 340) and the famous Ephraem Syrus. The Syriac text of the Homilies of the former was edited by Professor Wright in 1869, and Zahn has proved that the key to the difficulty of his gospel citations is the fact that he used the *Diatessaron*. Bar-Salibi, a Syrian bishop (12th cent.), distinctly states that Ephraem wrote an exposition of Tatian's *Diatessaron*. Lightfoot printed his famous article on Tatian (*Cont. Rev.* May 1877), ignorant of the fact that a year before Dr Moesinger of Salzburg had published at Venice a Latin translation of the same commentary, made as early as 1841 by Father Aucher of the Mechitarist monastery of San Lazzaro from the Armenian edition of Ephraem's works published in 1836 (4 vols.). The first scholar to make this remarkable discovery widely known was Ezra Abbot in his *Authorship of the Fourth Gospel* (1880). Next year Westcott noticed it in the 5th ed. of his *History of the N. T. Canon*, and Professor Wace began his admirable series of articles in the *Expositor*.

Aucher and Moesinger believe this Armenian version to have been made about the 5th century, and to be a translation from the Syriac, and from the whole facts of the case the constructive argument is so strong that we may without hesitation accept this as the work of Ephraem, and conclude that the basis of this commentary is a gospel harmony, and that the *Diatessaron* of Tatian.

Again, the Latin harmony of Victor of Capua, as it still exists in the *Codex Fuldensis* (pub. by Ranke, 1868), on examination was found to be substantially identical with the fragments of Ephraem. In 1881 Zahn published his masterly monograph on Tatian's *Diatessaron*, containing a reconstruction of the text from the Latin, based on Moesinger's Latin version of Ephraem's Commentary, on the quotations in Aphraates, and occasional parallels with the *Codex Fuldensis*. He showed that Tatian's original Syrian text agreed in great part with the Curetonian Syriac, and evidently preceded the Peshito or reformed Syriac text. The fresh interest thereby aroused in the question led Ciasca of the Vatican Library to examine anew the Arabic MSS. there. The existence of one was already known, it having been partially described by Assemani, Rosenmüller, and Akerblad. In 1886 Antonios Morcos, vicar-apostolic of the Catholic Copts, forwarded to Rome a 9th-century MS., which Agostino Ciasca edited for the jubilee of Pope Leo XIII., and this was found both in contents and arrangement to correspond with the work edited by Moesinger.

Harnack thus sums up the conclusions that may be drawn from what may be considered as proved: (1) In Tatian's time there was still no recognised N. T. Canon, and the texts of the gospels were not regarded as inspired; (2) about 160 our four gospels were already in existence and authoritative, and the fourth on an equality with the three synoptics; (3) the text of the gospels in 160 was

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substantially the same as it is now, save that intentional changes and interpolations were made later, as the passage about the church being built upon Peter the rock.

See Zahn, *Forschungen zur Geschichte des neutestamentlichen Kanons* (Bd. i. [1881]; Bd. ii. [1883], 286–299; and Bd. iv. [1891], 225–246—Sellin, *Der Text des Arabischen Diatessarons*); *Geschichte des neutest. Kanons*, II. i. 530–556 (1891); *Texte und Untersuchungen zur Geschichte der Altchristlichen Literatur*, by O. von Gebhardt and A. Harnack (Bd. iv. 1888); the admirable summary of the history of the *Diatessaron* and all the facts relating to it, by the Rev. Professor Samuel Hemphill (Dublin, 1888); and the Study by Professor J. Rendel Harris (1890); Harnack's article in the *Ency. Brit.*, W. Möller's in Herzog's *Real-Encyklopädie*, and Professor Moore's in the *Journal of Biblical Literature* (1890); also Hilgenfeld, *Die Ketzergeschichte des Urchristenthums* (1884).

Tatius, ACHILLES, one of the Greek romancers whose date may be safely put before the middle of the 4th and after the beginning of the 3d century A.D. He belonged to Alexandria, and was much influenced by the rhetorical school of poetry, which owned Nonnus as its master. Suidas tells us that he became not merely a Christian, but a bishop, after writing his romance of *Leucippe and Cleitophon*, but the accuracy of this may well be doubted. Further it is more than doubtful whether he was the author of treatises on etymology and astronomy. His romance comes next to the *Theagenes and Chariclea* of Heliodorus in time, and perhaps in merit. The author describes himself as gazing at the picture of Europa in the temple of Venus in Sidon, when he is accosted by Cleitophon, who straightway tells him his whole adventures in eight books. The plot is sadly lacking in probability, and grows positively wearisome towards its long drawn out conclusion. Its artistic development is marred by the introduction of much irrelevant discourse on painting, sculpture, and natural history, and moreover much of this is mere wordy rhetoric. The delineation of character is feeble to a degree—the hero a mere shadow of a man, uninteresting in everything save devotion to his mistress, who is much better drawn in every respect. Still the dawn of love in Cleitophon's heart is well described, and the doubts and fears characteristic of the passion are well realised, and reveal a striking knowledge of the human heart. Many of the situations are worse than indelicate, but the morality of the purpose, so characteristic of the Greek romances even in their indecencies, is evident throughout. The Greek is elegant, yet unaffected.

Editions are in the *Erotici Scriptores Græci* by Hirschig, Le Bas, and Boissonade (Paris, 1856), and Hercher (Leip. 1858–59); also separately, by F. Jacobs (Leip. 1821). There is a French translation in Ch. Zévort's *Romans Grecs* (Paris, 1856); an English, by the Rev. R. Smith in Bohn's Classical Library (1855). See A. Chassang, *Histoire du Roman dans l'Antiquité Grec. et Lat.* (Paris, 1862); E. Rohde, *Der Griech. Roman und seine Vorläufer* (Leip. 1876); and Dunlop's *History of Prose Fiction*, edited by Henry Wilson (2 vols. 1888.)

Tattersall's, a celebrated mart in London for the sale of racing and other high-class horses, and one of the principal haunts of racing men, so called from Richard Tattersall (1724–95), a native of Hurstwood in Lancashire, who came early to London, entered the service of the second Duke of Kingston, and ultimately became an auctioneer. In 1766 he took a ninety-nine years' lease from Lord Grosvenor of premises in Hyde Park Corner, and after its expiry Tattersall's was removed to Knightsbridge Green (1867). In 1779 Richard Tattersall bought the famous horse Highflyer of Lord Bolingbroke for £2500, and named his house at New Barns near Ely Highflyer Hall. Here he was often visited by the Prince of Wales from Newmarket. The prince was also a joint-owner with 'Old Tatt' in the *Morning Post*, and lost thereby £10,000, which was paid to Tattersall's heirs in 1810. See *Memories of Hurstwood* (Burnley, 1889), by Tattersall Wilkinson and J. F. Tattersall.

Tattooing, the custom of marking the skin with figures of various kinds by means of slight incisions or punctures and a colouring matter. The word itself is Tahitian (*ta*, 'a mark'), but the practice is very widely spread, being universal in the South Sea Islands, and also found among the North and South American Indians, the Dyaks, the Burmese, Chinese, and Japanese, and common enough still among civilised sailors. The absence upon the claimant of tattooed marks known to have been upon the body of Roger Tichborne was a point of much importance in the famous Tichborne trial. It is expressly forbidden in Scripture (Lev. xix. 28), from which we may conclude it was common amongst the neighbouring nations. Undoubtedly the main cause of its origin was the desire to attract the admiration of the opposite sex, but this fundamental human desire does not of course exclude motives for tattooing for religious or other ceremonial purposes, or for mere ornament apart from sexual considerations. Among the Polynesians the operation is attended with circumstances of ceremony, and the figures represented are often religious in signification or symbolic of rank, not seldom the *totem* or special tribal badge. The New Zealanders were distinguished by elaborate tattooing of the face, and many of their heads are preserved in European museums. As it was formerly a common custom for shipmasters to purchase these on visiting New Zealand there is little doubt that the demand stimulated the supply. Dr Wuttke labours to prove that tattooing is a kind of writing, but, whatever may be the case elsewhere, its origin in Japan, where it reached its greatest perfection, is neither ceremonial nor symbolical, but merely cosmetic. Its end is to take the part of a garment or decoration, those parts of the body only being tattooed which are usually covered, and only in the cases of such workmen as runners, grooms, bearers, who work in a half-nude state. Still further, this is found only in large and civilised towns where nudity might have been objectionable. It was a substitute for clothing, but now that clothing is compulsory in Japan it has lost its meaning, and may be expected to disappear. Dr Baelz, writing in 1885, estimated that a few years before there were in Tokio alone as many as 30,000 men who were tattooed. The head, neck, hands, and feet are never tattooed, and it is found among the lower classes alone, and very seldom amongst women, and these only the dissolute. The usual objects illustrated are large dragons, lions, battle scenes, beautiful women, historical incidents, flowers—never obscene pictures. The colours employed are black, which appears blue, derived from Indian ink, and various shades of red, derived from cinnabar. The artist uses in his work exceedingly fine sharp sewing-needles, fixed firmly four, eight, twelve, twenty, or forty together, and arranged in rows in a piece of wood. The points are quite even, except when it is desired to produce a light or dark shading. A skilful artist can cover the whole back or breast

Tattooed Maori Chief.

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and belly of a grown man in a day, and that with excellent pictures with various degrees of shading. These punctures are not very painful, and as soon as the operation is over the patient is bathed with hot water, which brings out the colour more clearly. Among the Ainos again the tattooing is done on the exposed parts of the body, and largely practised by women. The Igorrotos in the mountainous region above Luzon tattoo elaborately, but in series of lines and curves. They ornament the hands, arms, breast, and part of the legs, the back only in one tribe, and a favourite form is a picture of the sun as a number of concentric circles on the back of the hand. According to the Archduke Joseph of Austria, tattooing is unknown amongst the Gypsies, but this is questioned by Bataillard and MacRitchie.

Many savages paint their skins as a means of protection against cold, or against the sun's heat or the bites of insects; others again attempt thus to make their aspect more terrible in war, as Cæsar tells us did the ancient Britons. Tattooing has often been employed as a badge of brotherhood in some cause, and more often still as a means of identification for slaves and criminals. The so-called branding of the letters D. and B.C. on military deserters and incorrigible characters, only given up in 1879, was merely tattooing with needles and Indian ink. Among the relics of the ancient cave-men of Europe are hollowed stones in which were ground the ochre and other colours for painting themselves. The war-paint of the ancient Briton and Red Indian braves still survives in the paint-striped face of the circus-clown; and the rouge of the faded London beauty is merely the civilised equivalent of the Maori women's tattooing round the mouth, or the beautiful flower-patterns on the backs and bellies of the Formosans. Amongst the lower-class criminal population in Europe the practice of tattooing is still common, but almost exclusively amongst males, more than twenty designs being sometimes found on the same individual—transfixed hearts, swords, serpents, flowers, initials, a woman's figure, and occasionally obscenities. Among 800 convicted French soldiers Lacassagne found 40 per cent. tattooed, many with inscriptions which gave an index to the criminal's attitude to the world.

See Wuttke, *Die Entstehung der Schrift* (1872); Lacassagne, *Les Tatouages* (Paris, 1881); Baelz, in *Mittheilungen der deutschen Gesellschaft für Natur- und Völkerkunde* (May, 1885); and especially W. Joest, *Tätowiren Narbenzeichnen und Körperbemalen* (Berlin, 1887).

Tauchnitz, KARL CHRISTOPH TRAUGOTT, a famous German printer and bookseller, was born at Grosspardau, near Leipzig, October 29, 1761. Bred a printer, he set up in 1796 a small printing business of his own in Leipzig, with which he shortly after conjoined publishing and typefounding, and all his enterprise only added to his prosperity. In 1809 he began to issue editions of the Greek and Latin classics, the elegance and cheapness of which carried them over the learned world. He was the first to introduce (1816) stereotyping into Germany, and he also applied it to music. On his death, 14th January 1836, the business was continued by his son, KARL CHRISTIAN PHIL. TAUCHNITZ (1798–1884).—A nephew of the elder Tauchnitz, CHRISTIAN BERNHARD, BARON VON TAUCHNITZ, born at Schleinitz, 25th August 1816, also founded in 1837 a printing and publishing house in Leipzig. In 1841 he began his well-known collection of 'British Authors,' of which 2600 volumes appeared within the first fifty years. The enterprising publisher was ennobled in 1860, and made one of the few Saxon life-peers in 1877.

Tauler, JOHANN, German mystic, was the son of a wealthy citizen of Strasburg, where he was born about 1300. His education was entrusted to the Dominicans in Strasburg and Cologne. When Tauler was twenty-four years of age the clergy of his native city, where he then lived, were prohibited from performing the religious services in consequence of a papal interdict having been launched against Strasburg, because it took a different side from the pope in a disputed imperial election. Tauler, however, and his colleagues continued to officiate. But the heads of the order forbidding them to do so, the magistrates banished the Dominicans from the city. For some seven years or so Tauler found refuge in Basel, where coming in contact with the Friends of God, a sort of free association for deepening religious life, his views underwent a great change. Some ascribe this 'conversion' to Nicholas of Basel; others discredit the fact altogether; whilst others again admit it, but dispute the identity of the agent. At all events, from this time forward Tauler became the centre and source of the quickened religious life in the valley of the middle Rhine, his repute as an eloquent and earnest preacher spreading far and wide. His banishment over, he returned to Strasburg, and is believed to have stayed behind there during the Black Death, to minister to the sick and sustain the courage of the living. He died in 1361. Prior to his conversion Tauler seems to have been a disciple of Master Eckhart (q.v.), at whose feet he probably sat when a young student, and thus he belongs to the Mystics (q.v.). The change that took place in him at Basel turned his thoughts from speculative thinking to pious exhortation and practical doing; and it is this note of sincere practical piety that especially distinguishes his *Sermons*, which are reckoned amongst the finest in the German language. Another work of a more speculatively mystical tendency, *Following in the Footsteps of Christ*, is by some attributed to Tauler.

See K. Schmidt, *Johann Tauler* (1841); Denifle, *Das Buch von geistlicher Armut* (1877); Ritschl, in *Zeitschrift für Kirchengeschichte* (1880); Miss Winkworth, *Tauler's Life and Sermons* (Lond. 1857).

Taunton, a pleasant, well-built town of Somersetshire, in the fair and fertile valley of the Tone ('Taunton Deane'), 45 miles SW. of Bristol. Here about 710 Ine, the West Saxon king, built a fortress, which, passing with the manor to the bishops of Winchester, was rebuilt by Bishop William in the first quarter of the 12th century. Added to in the 13th and 15th centuries, this castle received Perkin Warbeck (1497), and was held by Blake (q.v.) during his famous defence of the town (1644–45). In its great hall, fitted up now as a museum, Judge Jeffreys opened the 'Bloody Assize,' hanging 134 and transporting 400 of the inhabitants of Taunton and the neighbourhood who had accorded Monmouth an enthusiastic welcome (1685); and here too Sydney Smith made his 'Mrs Partington' speech (1831). The church of St Mary Magdalene has a noble Perpendicular tower 153 feet high (*c.* 1500; rebuilt 1858–62); and other buildings are the Elizabethan shire-hall (1858), the municipal buildings (formerly the grammar-school founded by Bishop Fox in 1522), King's College school (1880), Independent college (1847–70), Wesleyan Institution (1843), Huish schools (1874), Bishop Fox's girls' school, hospital (1809–73), barracks, &c. Formerly one of the great 'clothier towns' of Somerset, Taunton now has shirt, collar, glove, and silk manufactures, with a large agricultural trade. It was thrice chartered (1627, 1677, 1877) as a municipal borough, and lost one of its two members in 1885. Pop. (1851) 14,176; (1891) 18,026.

See works by Toulmin (2d ed. 1822), Cottle (1845), Macmullen (1860–62), Jeboult (1873), and Pring (1880).

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Taunton, capital of Bristol county, Massachusetts, at the head of navigation on Taunton River, 34 miles by rail S. of Boston. It contains a fine park, a court-house, city hall, a state lunatic asylum, and numerous foundries and cotton-mills, locomotive and copper works, shipyards, and manufactories of bricks, nails, jewellery, &c. Taunton was settled from Taunton in England in 1637. Its first minister was William Hooke, who afterwards married Cromwell's cousin, and became his chaplain. Pop. (1880) 21,213; (1890) 25,448.

Taunus Mountains. See HESSE-NASSAU.

Taurida, a government of South Russia, with more than twice the area of Belgium (see RUSSIA), bounded on the E., S., and SW. by the Sea of Azov and the Black Sea. The peninsula of the Crimea (q.v.) forms the southern portion of the government, and is connected with the northern portion by the Isthmus of Perekop (q.v.).

Taurus, MOUNT. See ASIA MINOR.

Tautog (*Tautoga onitis* or *americana*), a fish of the family to which the Wrasse (q.v.) belongs, found in the North American seas, and in great request for the table. It attains a weight of 12 or 14 lb. Its colour is black on the back and sides; the belly is whitish; each jaw has a double row of strong conical teeth; the face is covered with a scaleless integument. It is also called Black-fish and Oyster-fish.

Tautphoeus, BARONESS, novelist, is the daughter of James Montgomery of Salthill, Ireland, who married an official at the Bavarian court. She is known as the authoress of a series of novels in English, mainly pictures of South German life, manners, and history, including *The Initials* (1850), *Cyrilla* (1853) *Quits* (1857), and *At Odds* (1863).—Florence Montgomery (q.v.) is her niece.

Tavastehus, capital of a government in Finland, on Lake Vanajäjärvi, 50 miles N. of Helsingfors. Pop. 4098.

Tavern. See INN, LICENSING LAWS.

Tavernier, JEAN BAPTISTE, BARON D'AUBONNE, a celebrated French traveller, was the son of an Antwerp Protestant engraver who had settled in Paris, and was born there in 1605. The conversation of the savants who frequented his father's shop made him a traveller at fifteen, and by the age of twenty-two he had seen France, England, the Low Countries, Germany, Switzerland, Poland, Hungary, and Italy. His *first journey* to the East lasted from about the beginning of 1631 to the summer of 1633, by Constantinople to Persia, thence by Aleppo and Malta to Italy. The *second journey* (1638–43) was from Marseilles to Alexandretta, across Syria to Ispahan, thence to Dacca, Agra, Surat, Goa, and Golconda; the *third* (1643–49), through Ispahan, much of Hindustan, Batavia, and Bantam, whence to Holland by the Cape and St Helena; and in the *fourth* (1651–55), *fifth* (1657–62), and *sixth* (1663–68) many districts of Persia and India were visited, the outward route being generally by way of Syria and the Arabian Desert, and the return one by Asia Minor. Tavernier invariably travelled as a dealer in precious stones and other valuable articles of small bulk, and the great profits he realised strongly impressed upon him the advantages of regular commerce between Europe and the East. He was well received by most of the eastern potentates—the Shah Abbás II. in 1657 gave him a robe of honour and made him his jeweller in ordinary, and the Great Mogul Aurungzebe kept him to see his annual festival in 1665. Louis XIV. gave him 'letters of nobility' in 1669, and next year he bought the barony of Aubonne near Geneva. In 1684 he started for Berlin to advise the Elector of Brandenburg in his projects for eastern trade. Next year he sold his estate, but it is quite unlikely that he was thrown into the Bastille after the revocation of the Edict of Nantes. He sent his nephew to India with a valuable cargo, but is supposed to have been defrauded by him. In 1687 we find the veteran traveller obtaining a passport in Switzerland, next year he appears to have been at Copenhagen, and in February 1689 he arrived in Russia, where he died at Moscow before the close of the year. His famous *Six Voyages* was published in 1676; the complementary *Recueil* in 1679. Tavernier traversed the plains of Troy, and passed the ruins of Persepolis without even a flutter of interest, and partly perhaps from this habit of mind his statements are accurate and truthful beyond the measure of travellers. But the chief value of his book lies in the fullness and accuracy with which are detailed the nature and state of oriental commerce, the chief markets and commercial routes, the precious stones found, and the various systems of coinage. Editions of the Travels are of 1810 (7 vols.) and 1882 (abridged).

See *Travels in India*, trans. by Dr V. Ball (2 vols. 1890), and Charles Joret, *Jean Baptiste Tavernier d'après des Documents Nouveaux* (1886).

Tavira, a seaport of Portugal, on the Sequa, 20 miles NE. of Faro. It has sulphur-baths, sardine and tunny fisheries, and a pop. of 11,459.

Tavistock, a pleasant market-town of Devon, 11 miles N. of Plymouth and 31 (by rail 40) SW. of Exeter, lies in a trough of the hills on the Tavy's left bank, with Dartmoor stretching away from it to the eastward. An old stannary town, till 1885 governed by a portreeve, it is the centre of what not many years ago was a great mining district; and it sent two members to parliament till 1867, then one till 1885. Two gateways, a porch, and the refectory are the chief remains of its once magnificent Benedictine abbey, founded in 961 by Ordgar, ealdorman of Devon, and father of the infamous Elfrida. It was rebuilt between 1285 and 1458, was the seat of a very early printing-press, and had a revenue of £902 at the dissolution in 1539, when it was conferred on the first Lord Russell, remaining still with his descendant, the Duke of Bedford. The parish church (1318) is a fine structure, with a west tower (106 feet) resting on arches. Tavistock has also a guildhall (1848), corn-market (1839), covered markets (1863), statues of the seventh Duke of Bedford by Stephens (1864) and Drake by Boehm (1883, a very fine one presented by the ninth Duke), and the Kelly College (1877), founded by Admiral B. M. Kelly. Drake and William Browne were natives, Pym and William Lord Russell members; and the Right Hon. W. H. Smith was educated at the grammar-school. Pop. (1851) 8086; (1891) 6252.

See works by A. J. Kempe (1830), Rachel Evans (1846), R. N. Worth (1888), and the Rev. D. P. Alford (1891).

Tavoy', the chief town of a district in Tenasserim, Burma, on the left bank of the Tavoy River, 30 miles from its mouth. Pop. 13,372.

Tax is a term wide enough to include all payments imposed by the government of a state on the persons and property within its jurisdiction. The revenue of a state is often derived in part from property held and managed by public authorities: the silver mines of Laurium belonged to the Athenian republic; and in the middle ages the king of England drew a large income from his crown-lands. Again, the revenue of a state is derived in part from payments for services performed—from the fees paid by suitors in the courts, the profits of the post-office, &c. If an adequate income could be obtained from these sources, it would not be necessary to levy taxes at all; but

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no modern government has been able to subsist without taxation. In England the usage of six hundred years has established the rule that taxes are not to be levied unless with consent of parliament; and the House of Commons, as representing the general body of taxpayers, has taken the lead in voting money to the government, and in pointing out the ways and means by which the money is to be raised. It is the 'power of the purse' which makes the House of Commons politically supreme. The general principles to be applied by a taxing authority are tolerably plain and obvious. Taxes should be productive; it is not good policy to harass any interest for the sake of a small gain. They ought to be easily collected; it is not wise to allow the expenses of collection to eat up the tax. They ought to be just; that is to say, the sacrifice demanded from the individual citizen should be proportioned to his means. But abstract justice must be largely qualified by regard for usage; any sudden change in the incidence of taxation causes a disturbance of business, and so tends to diminish the wealth of the community. The chief object to be kept in view is the raising of the revenue required for public purposes, but taxation may be used for other ends. For example, taxes on intoxicating liquor and other luxuries are often defended on the ground that they discourage and restrict the sale of the articles taxed. Protectionists advocate high customs duties for the purpose of excluding foreign goods from competition with native industry. There are also many politicians who think that taxation may be used to correct social inequalities and to undo the effect of what seem to them to be unjust laws. The disciples of Mr Henry George would nationalise the land by taxing the owners at the rate of 20s. in the pound. Graduated taxation is recommended on the ground of abstract justice; it is suggested, for instance, that the income-tax and succession duty on an estate of £10,000 a year should be ten times as heavy as on an estate of £1000 a year. Schemes of this kind are attended by considerable practical difficulties; for high taxes lead to evasion and concealment, and rich men may even be tempted to remove themselves and their capital to another country.

Direct taxes (income-tax and succession duty for example) are paid by a person who cannot shift the burden of payment to another; indirect taxes (customs and excise for example) are paid by one person, while the burden falls on another. The duty on tea is paid by the importer, but he raises his price to cover the duty; it is therefore in fact paid by the consumer. Direct taxation is preferable, because it is levied on property, and can be adapted to the taxpayer's means. Indirect taxation is more easily raised; labouring people especially object to be called upon to pay money, while they are hardly conscious of the large contribution they make to the revenue in the shape of tea-duty and tobacco-duty. Where a government relies on customs and excise duties, it is good policy to refrain from taxing the necessaries of life and the raw materials of industry, and to put the duties on articles of luxury, such as beer and spirits, or tea and coffee. The amount of such duties must be fixed with care; for a high duty checks consumption, a low duty encourages it; for this reason a high duty is often less productive than a low one. Besides the taxes imposed by a national government (the Queen's taxes, as they are called in England) local authorities are usually permitted to levy rates and duties. In some countries octroi or import duties are paid on goods brought into a town; but the octroi is even more objectionable than a duty on foreign produce, inasmuch as it tends to discourage trade between different parts of the same country.

In taxation, as in other matters, the nations of modern Europe have followed closely the precedents of the Roman empire. The revenue of the emperor was raised by means of a tributum or land-tax, customs duties varying from one-fortieth to one-eighth of the value of goods imported, excise duties on certain trades, and a tax on legacies and successions. On the fall of the empire the prevalence of feudal ideas led to a complicated system of territorial exactions; the towns were able to purchase their freedom, but the peasantry were grievously burdened. The formation of strong national governments brought little relief to the people, except when, as in England, there was a representative body strong enough to limit the demands of royal power. France under Louis XIV. may be quoted as a typical example of the evils caused by unjust taxation, unjust exemption of privileged classes, and a bad system of collection; the taxes were farmed out to private speculators, and the necessaries of life were rendered outrageously dear; the salt-tax especially is always named among the worst abuses of the old régime. The economists of the 18th century recalled the minds of statesmen to true principles, while practical reformers like Turgot showed them 'how to pluck the goose without making it cry.' Since the revolt of the English colonies in America (a revolt caused by an impolitic attempt to tax self-governing communities without their consent), and the abolition of feudalism in France at the Revolution, the revenue laws of civilised countries have been greatly altered and improved. In the United Kingdom customs duties are now levied on a few articles, none of which can be described as necessaries; excise duties, once highly unpopular, are levied only on intoxicating liquor, and on some more or less privileged trades and professions; the income and property tax, remodelled by Sir R. Peel in 1842, is fairer and more searching than the old land-tax; the probate and succession duties help to relieve trade and industry at the expense of realised property. Complaints of the incidence of taxation are still very common, and no political question is more keenly discussed. There is much difference of opinion as to land, some contending that land-values should be more heavily taxed, others again maintaining that the land is unfairly burdened, and that personal property should be made to contribute to local rates.

For particulars of the revenue of modern governments, see the *Statesman's Yearbook* and the works there referred to; also the articles in this work on the various countries (Great Britain, United States, &c.). Adam Smith and Ricardo are still the highest English authorities on the principles of taxation. See also A. J. Wilson's *Resources of Modern Countries* (1878); Goschen on *Local Taxation* (1873); S. Dowell, *Taxation and Taxes in England from the Earliest Times* (2d ed. 4 vols. 1888); works on the law of taxation in the United States by Burroughs (1876) and Cooley (1877); Boutwell, *Taxation System of United States* (1863); R. T. Ely, *Taxation in America* (1888); J. Dean Goss, *The History of Tariff Administration in the United States* (1891); French works by Parieu (1866) and Rousset (1883); German works by Schäffle (1880), Roscher (1886), Meyer (1884), Mangoldt (1886); also works noted at POLITICAL ECONOMY, and the articles on Aids, Benevolence, Budget, Corn Laws, Customs Duties, Excise, Free Trade, Income-tax, Land Laws, Legacy, National Debt, Poor-laws, Protection, Smuggling, Tonnage and Poundage, &c.

Taxation of Costs. See COSTS.

Taxidermy, the name given to the art of putting up natural history specimens in the dried state. It includes the skinning and stuffing of fishes, reptiles, amphibians, birds, and mammals; also the preserving, drying, and setting up of insects and other invertebrata. But it does not

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properly comprise the making of wet zoological preparations which are to be preserved in spirits; nor, strictly speaking, does it include the articulating of skeletons, although this is usually treated of in books on taxidermy.

For the skinning of animals a few tools, such as scalpels, scissors, and forceps, are required. Incisions must be made in certain directions. Care has to be taken not to stretch the skin in detaching it from the body, and it is necessary to avoid soiling the plumage of birds or the hair and fur of mammals with blood or grease. The skull and certain wing and leg bones are left in their place to preserve as perfectly as possible the form of these parts in case of the skin being afterwards mounted. Considerable difference of opinion has of late years arisen as to the best treatment for preserving or, as it is sometimes called, poisoning skins. Arsenical soap is still largely used. It commonly consists of arsenious acid 1 oz., white soap 1 oz., carbonate of potash 1 drachm, distilled water 6 drachms, and camphor 2 drachms. To preserve bird skins some prefer powdered white arsenic (arsenious acid) either alone or mixed with powdered alum; and nothing else is much used in the United States. But sometimes powdered oak-bark and a little camphor are added, the proportions being arsenic 1 part, alum 1 part, bark 2 parts, camphor ½ part. These powders should be applied to the inner surface of the skin when it is moist. A non-poisonous preservative soap of the following composition has been recommended: chalk 2½ lb., soft soap 1 lb., chloride of lime 2 oz., tincture of musk 1 oz. But as it is difficult to prevent a little free chlorine escaping from chloride of lime, there must be some risk of corroding or rotting skins by the use of this mixture. These dry powders should be well rubbed, and the soapy mixtures carefully brushed, into the wet surface of skins. An alcoholic solution of corrosive sublimate is a good preservative for skins, but it is very poisonous. For cleaning feathers, and especially those that are light coloured, powdered plaster of Paris is very effective. Wherever bird skins or the fur-covered skins of mammals are kept camphor or naphthaline should be present. The latter is more obnoxious to destructive moths than the former, as it has a powerful and peculiar odour. Benzene is also very useful. Butterflies, moths, and other insects require to be kept in drawers or boxes of a peculiar construction to prevent the escape of the vapour of camphor or other preservative.

It would occupy too much of our space to describe in detail the process of stuffing or mounting an animal. Before the taxidermist can stuff or mount well he requires some training in anatomy and modelling, and a knowledge of the external forms of animals, as well as some acquaintance with their habits. He cannot be a master of the art unless he has the artistic faculty in a high degree. With rare exceptions, the remuneration hitherto obtained for stuffing animals has not been sufficient to secure the services of persons trained to produce high-class work. This explains why so many specimens in museums of natural history are so faulty and unattractive. That birds, mammals, and other animals can be made beautiful, instructive, and even of real service to science in the mounted state is, however, clearly seen in some examples of the handiwork of Hancock of Newcastle, Ward of London, Verreaux of Paris, and others. But specimens of the taxidermist's art far in advance of anything ever attempted before have within the last few years been prepared for the natural history museum at South Kensington. Here to each species of British birds a glass case is (or will be) devoted, in which are placed the male, female, and eggs, or young. In addition, the nesting-place of the bird, whether this be a sylvan, pastoral, sandy, or rocky spot, is carefully modelled to show its habitat. All this is represented with so much truth and fidelity to nature, and is in every way so interesting and attractive, as to cause regret that only the funds at the disposal of a great national institution can cope with so costly an undertaking.

See *Methods of the Art of Taxidermy*, by Oliver Davie (1892); *Practical Taxidermy*, by Montagu Browne (1884); *Field Ornithology*, by Coues (1890); and *Taxidermy*, by W. T. Hornaday (1891).

Tay, a river of Scotland, draining nearly the whole of Perthshire, and pouring into the German Ocean a greater bulk of water than any other British river, rises on Benloy, on the Argyllshire border, at an altitude of 2980 feet. Thence it winds 118 miles east-north-eastward, south-south-eastward, and eastward—for the last 25 miles as a tidal estuary, ½ mile to 3½ miles broad, which separates Perth and Forfar shires from Fife. In the first 25 miles of its course it bears the names of Fillan and Dochart; it then traverses Loch Tay, and it afterwards passes Aberfeldy, Dunkeld, Stanley, Perth, Dundee, and Broughty-Ferry. Its principal affluents are the Tummel (58 miles long, and sometimes regarded as a northern head-stream), Isla, Almond, and Earn. The Tay, as it is the most beautiful of Scottish rivers, so it is unrivalled for its salmon-fisheries, whose rental in good years exceeds £20,000. Vessels of 100 tons can ascend as high as Perth, but even to Dundee the navigation of the firth is much impeded by shifting sandbanks.

Loch Tay lies 355 feet above sea-level, extends 14½ miles north-eastward from Killin to Kenmore, is ½ to 1½ mile broad, 15 to 100 fathoms deep, and covers 6550 acres. It is a magnificent Highland lake, flanked on the north-west by Ben Lawers (4004 feet), and containing near its foot a wooded islet, with a fragment of an Augustinian priory, founded in 1122 by Alexander I., who here buried his queen, Sibylla. In September 1842 Queen Victoria was rowed up Loch Tay, on which a steamer was first launched in 1883, and a railway to which, at Killin, was opened in 1886.

See the articles Pisciculture, Dundee (for the Tay Bridge), Rannoch, Earn, Perthshire, &c., and works there cited, with J. Geddie's finely illustrated monograph on the Tay (1892).

Tayler, John James, an eminent Unitarian divine, was born at Newington Butts, August 15, 1797, son of a minister in London, next at Nottingham. He studied at Manchester New College (which was located at York 1803–40), at Glasgow University, and again at York, was ordained to Mosely Street Chapel at Manchester in 1821, and became professor of Ecclesiastical History in 1840 on the return of the college to Manchester. He spent a year (1834–35) in study at Göttingen and Bonn, removed with his college to London in 1853, becoming principal as well as professor, was joint-minister with James Martineau of Little Portland Street Chapel (1858–60), and died 28th May 1869. He wrote much for the *Prospective Review*, which passed in 1855 into the *National Review*, and made way in 1864 for the *Theological Review*, a list of as many as 102 books, discourses, and articles being appended to the collection of his *Letters*, edited by J. Hamilton Thom (2 vols. 1872).

Of the books the chief were *A Retrospect of the Religious Life of England* (1845), which Martineau styles 'the most charming of ecclesiastical histories;' *Christian Aspects of Faith and Duty* (1851); and *An Attempt to ascertain the Character of the Fourth Gospel* (1867).

Taylor, Bayard, an American author and traveller, was born, of Quaker and German ancestry, at Kennett Square, Chester county, Pennsylvania, January 11, 1825. Having received a

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common school education, he was apprenticed at seventeen in a printing-office, in 1844 published *Ximena*, a volume of poems, and started on a pedestrian tour of Europe, and in 1846 published *Views Afoot, or Europe seen with Knapsack and Staff*. After his return he edited a country newspaper, then went to New York, and obtained a post on the *Tribune*. As its correspondent he made extensive travels in California and Mexico, recorded in *El Dorado* (1850), and up the Nile, and in Asia Minor, Syria, across Asia to India, China, and Japan—recorded in his *Journey to Central Africa and Land of the Saracen* (1854), and *Visit to India, China, and Japan* (1855). Later explorations are recorded in *Northern Travel* (1858), and *Travels in Greece and Russia* (1859). In 1862–63 he was secretary of legation at St Petersburg; in 1874 he visited Iceland. In May 1878 he became ambassador at Berlin, where he died 19th December of the same year. His principal reputation, however, was as a poet. His works include *Rhymes of Travel* (1848); *Book of Romances, Lyrics, and Songs* (1851); *Poems of the Orient* (1854); *Poems of Home and Travel* (1855); *The Poet's Journal* (1862); *Poems* (1865); *The Masque of the Gods* (1872); *Lars* (1873); *The Prophet, a Tragedy* (1874); *Home Pastorals* (1875); *The National Ode* which he was chosen to deliver at the Centennial Exhibition (1876); *Prince Deukalion*, a drama (1878); and an admirable translation of *Faust* (1870–71). He also wrote several novels, the best *Hannah Thurston* (1863) and *The Story of Kennett* (1866). See his *Life and Letters* (2 vols. 1884).

Taylor, BROOK, mathematician, was born of good family at Edmonton in Middlesex, August 18, 1685, and studied at St John's College, Cambridge. In 1715 he published his *Methodus Incrementorum Directa et Inversa*, the foundation of the Calculus of Finite Differences. Herein also is the formula which, as 'Taylor's theorem,' will keep his name from ever being forgotten. In 1716 he visited Paris and was warmly received by the French savants. From 1714 till 1718 he acted as secretary to the Royal Society. His last years were given to speculations in philosophy and religion, and were darkened by the early deaths of two successive wives. He himself died December 29, 1731. Other works were a *Treatise on Linear Perspective* (improved ed. 1719) and the posthumous *Contemplatio Philosophica* (edited by his grandson, Sir W. Young, with Life, 1793). Several short papers may be found in the *Phil. Trans.* (1713–23).

Taylor, SIR HENRY, poet, was born, the son of a gentleman-farmer of unusual culture, at Bishop-Middleham in Durham, October 18, 1800. At fourteen he went to sea as midshipman, but was happy to obtain his discharge after nine miserable months, and two years later was given a clerkship in the Storekeeper-general's Department. After four years' service, including a few months in Barbadoes, he lost his post through internal official rearrangements, and returned to his father's house, Witton Hall, to spend two years of uninterrupted quiet and study. He began to write for the *Quarterly*, and in 1823 settled in London, having been appointed through the influence of Dr (after Sir Henry) Holland to a clerkship in the Colonial Office. Here he laboured for forty-eight years under as many as twenty-six secretaries of state, retiring only in 1872. He declined in 1847 the post of permanent under-secretary in succession to Sir James Stephen, and in 1869 was made K.C.M.G., partly for his public services, partly for his literary work—the latter also acknowledged by the D.C.L. degree at Oxford in 1862. His last days were spent at Bournemouth, and here, March 27, 1886, he ended a long and happy life, the happiness of which was in great measure due first to his admirable step-mother, later to his equally admirable wife, Alice Spring Rice, a daughter of Lord Monteagle. Taylor wrote four tragedies in the Shakespearian manner: *Isaac Comnenus* (1827), *Philip van Artevelde* (1834)—an immediate success, *Edwin the Fair* (1842), and *St Clement's Eve* (1862); and one romantic comedy, *The Virgin Widow*, afterwards entitled *A Sicilian Summer*. In 1845 he published a small volume of lyrical poetry, and in 1847 *The Eve of the Conquest and other Poems*. His work in prose embraced *The Statesman* (1836), a collection of Baconian discourses on official life and the methods of managing men, for which, as he himself says, 'Pragmatic Precepts' would have been a better title; *Notes from Life* (1847)—one of its essays, *The Life Poetic*, mainly a eulogy of Southey; and *Notes from Books* (1849), half made up of two articles on Wordsworth. Last came his interesting *Autobiography* (2 vols. 1885), admirably written, full of genial observation, and not marred at all by the pardonable egotism of age and merit. It contains a fine series of pen-portraits of such contemporaries as Wordsworth, Southey, Scott, Sydney Smith, Mill, Sir James Stephen, Spedding, Carlyle, Tennyson, and Aubrey de Vere. It was supplemented by his only less delightful *Correspondence* (1888), a selection of 202 letters, edited by Professor Dowden, including also letters to Taylor, from Wordsworth, Southey, Stephen, Mrs Norton, Macaulay, Spedding, Tennyson, Aubrey de Vere, Gladstone, Dr John Brown, and Swinburne. A uniform collected edition of his works had appeared in 5 vols. in 1878.

Taylor, ISAAC, writer of many books on religious and philosophical subjects, was born at Lavenham in Suffolk in 1787. His father, Isaac Taylor the first (1759–1829), was originally a London engraver, but in 1796 became Independent minister at Colchester, in 1811 at Ongar in Essex, and published a score of volumes. Charles Taylor (1756–1821), editor of Calmet's *Bible Dictionary*, was an uncle, and two sisters were Jane Taylor (1783–1824), author of the *Contributions of Q.Q.*, and Ann Taylor (Mrs Gilbert of Nottingham, 1782–1866; *Autobiography*, 1871), joint-authors of the famous *Hymns for Infant Minds* and *Original Poems*. After a course of study he settled down to a busy literary life at Ongar, where he died, June 28, 1865. As early as 1818 a writer in the *Eclectic Review*, he lived to contribute to *Good Words*—a period of over forty years. In 1862 he was granted a Civil List pension of £100. Of his many books the most important were the *Natural History of Enthusiasm* (1829), *The Natural History of Fanaticism* (1833), *Spiritual Despotism* (1835), *Physical Theory of Another Life* (1836), and *Ultimate Civilisation* (1860).—His eldest son, ISAAC TAYLOR, was born at Stanford Rivers, May 2, 1829, had his education at Trinity College, Cambridge, took orders, and after acting as curate in London and elsewhere, and as vicar of St Mathias, Bethnal Green (1865–69), and Holy Trinity, Twickenham (1869–75), was presented to the rectory of Settrington in Yorkshire in 1875, and collated to a canonry of York in 1885. His *Words and Places* (1864) made him favourably known as a philologist, whilst his great work, *The Alphabet, an Account of the Origin and Development of Letters* (2 vols. 1883), deservedly brought him a wide reputation. Other publications are *The Family Pen; Memorials, Biographical and Literary, of the Taylor Family of Ongar* (2 vols. 1867); *Etruscan Researches* (1874); *Greeks and Goths, a Study on the Runes* (1879); and *The Origin of the Aryans* (1890). Besides these he has contributed much to the learned journals, and not a few articles on philological questions to the present work.

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Taylor, JEREMY, the glory of the English pulpit, was the third son of a Cambridge barber of Gloucestershire family, a descendant of Dr Rowland Taylor, the Marian martyr, and was born in that town, and baptised on August 15, 1613. At thirteen he entered Caius College as a sizar, graduated B.A. in 1630–31, and, according to his friend and successor Bishop Rust, was thereafter chosen fellow of his college. At any rate he became M.A. in 1633, about the same time being admitted to holy orders, and soon after he attracted the notice of Laud, who had a regard for learning, if none for liberty, and was preferred through his influence to a fellowship at All Souls in Oxford (1636). He became also chaplain to the archbishop, and in 1638 was presented by Bishop Juxon to the rectory of Uppingham. About this time Wood tells us he was suspected by watchful zealots of a concealed attachment to the Romish communion, whether from his ascetic notions of piety, his veneration for antiquity and love for the picturesque aspects of religion, the favour of Laud, or his friendship with the learned and pious Franciscan friar, Francis a Sancta Clara [Christopher Davenport]. Taylor married Phœbe Landisdale, or Langsdale, in 1639; his second wife, Joanna Bridges, was believed by Bishop Heber, chiefly on the authority of the MS. of Mr Jones, a descendant of Taylor's, to have been an illegitimate daughter of Charles I. when Prince of Wales. His *Episcopacy asserted against the Acephali and Aërians New and Old* (1642) scarcely gave promise of his future powers, but gained him the empty honour of a D.D. degree. During the struggle Taylor is supposed to have accompanied the royal army as a chaplain, but about the close of 1643 we find him living with his mother-in-law and children, and embarrassed by poverty. Heber thinks his first wife was already dead, and that soon after this time he married his second, and retired to her property at Mandinam in Caermarthenshire. At any rate, after the downfall of the cause he found a shelter in Wales, and for some time he joined in keeping a school at Newton Hall in the parish of Llanfihangel. Here he found a kind patron in Richard Vaughan, Earl of Carbery, then living at the family seat of Golden Grove, immortalised in the title of Taylor's still popular manual of devotion (1655). His second countess was Alice, daughter of John Egerton, first Earl of Bridgewater, and the original of the 'lady' in Milton's *Comus*. During the last thirteen years (1647–60) of Taylor's enforced seclusion appeared all his great works, some of these the most enduring monuments of sacred eloquence in the English language. The first was *The Liberty of Prophesying* (1647), a noble and comprehensive plea for toleration and freedom of opinion, far above the ideas of its age, and even of its author in his turn of triumph. Here he takes the Apostles' Creed as the minimum standard of Christian communion, the only necessary terms of such being those dogmas that are capable of being propounded *infallibly;* that is, from Scripture, in the due exercise of Reason, all such errors as may arise being necessarily venial, when not wilful. 'Heresy is not an error of the understanding, but an error of the will,' to which proposition Coleridge aptly adds its converse, 'faith is not an accuracy of logic, but a rectitude of heart.' 'Those creeds are best which keep the very words of Scripture; and that faith is best which hath greatest simplicity; and it is better in all cases humbly to submit, than curiously to inquire and pry into the mystery under the cloud, and to hazard our faith by improving our knowledge.' He next passes in review the alleged special sources of authority in religious opinion: Scripture, Tradition, Ecclesiastical Councils, the Pope, and the Fathers, finding all save Scripture, interpreted by an enlightened reason, insufficient and contradictory. With regard to civil government he lays down broadly the principle that it is not concerned with opinions, however false or absurd, unless these tend directly to the prejudice of government as such, thus demanding the widest toleration for honest opinion ranging from Anabaptism to Popery. The second edition (1659) closes with the celebrated story of Abraham and the idolatrous traveller.

In 1650 followed the *Life of Christ, or the Great Exemplar*—an arrangement of the facts in historical order, interspersed with prayers and discourses on topics suggested by the narrative. That same year appeared *The Rule and Exercises of Holy Living*, followed in 1651 by its counterpart, *The Rule and Exercises of Holy Dying*, together forming to generation after generation the choicest classic of English devotion. The twenty-seven *Sermons* for the summer half-year were published in 1651; the twenty-five for the winter half-year in 1653. These, with the discourses in the *Life of Christ* and many passages in the *Holy Living* and *Dying*, contain the richest examples of their author's characteristically gorgeous eloquence. The polemical and practical treatises are more subdued in style, though still figurative and allusive far beyond the measure even of his contemporaries; but here he gave full reins to an imaginativeness unmatched alike in range of illustration and in opulence of language. The solemn music of his words, the rich beauty of the imagery in his incidental metaphors, the tenderness, passion, colour, and force, if not precision, of phrase combine to place these writings by themselves on a level scarce attained by all the Asiatic eloquence of Chrysostom.

The more formal treatises were *An Apology for Authorised and Set Forms of Liturgy against the Pretence of the Holy Spirit* (1646); *Clerus Domini, or a Discourse of the Divine Institution, Necessity, Sacredness, and Separation of the Office Ministerial* (1651); *The Real Presence and Spiritual of Christ in the Blessed Sacrament proved against the Doctrine of Transubstantiation* (1654); *The Unum Necessarium, or the Doctrine and Practice of Repentance* (1655), a treatise with a decided taint of Pelagianism, where the theologian had ventured beyond his depth, and which involved him in a cloud of controversy; *The Worthy Communicant* (1660); *Defence and Introduction to the Rite of Confirmation* (1663); *The Dissuasive from Popery* (1664); and the famous *Ductor Dubitantium, or the Rule of Conscience in all her General Measures* (1660), the most learned and subtle of all his works, which he himself counted on as the foundation of his fame. Intended as a complete handbook of Christian casuistry and ethics, it labours first to establish a system of morality on the basis of the will of God revealed to us through Conscience, distinguishing with greater subtlety than security the right or sure conscience, the conscience confident in error, the probable or thinking, the doubtful, and the scrupulous conscience. Under the 'probable' head he gives a magnificent sketch of the different probabilities on which a faith in Christianity is founded. The second book discusses the obligations of conscience in relation to the law of nature and the law of Christ, closing with a splendid peroration on the measures and motives of a Christian's duty. In the third book he passes to human positive law alike of church and state, and in the fourth—the best part of the whole—he closes with a discussion of the nature and causes of good and evil, and the efficient and final causes of human actions. But Taylor is much more a rhetorician than a thinker or even a theologian, and his imagination too often carries him at a leap from an illustration to an argument, from

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an analogy to a conclusion. Distinctions without a difference, inconsistencies, sophistries, and prolixity are foibles that too easily beset his argument, and go far to mar the effect of vast erudition, subtlety of thought, and dazzling eloquence. Besides the real bases of the controversy have shifted far from the 17th-century landmarks, and much of his subtlest argument is to modern men a mere beating of the air. Nor is he altogether free from the special sin of casuistry in its narrowest sense—he maintains that private evil may be done for the public good, that in controversy it is allowable to employ arguments and authorities we know to be invalid, and he is able to justify on moral grounds the fraudulent Israelitish borrowing from the Egyptians. He is besides much too slavish in his respect for authority and tradition, but, as Coleridge says well, Jeremy Taylor 'would have been too great for man had he not occasionally fallen below himself.'

During the troubles Taylor was thrice imprisoned, once for the preface to the *Golden Grove;* the last time in the Tower for an 'idolatrous' print of Christ in the attitude of prayer in his *Collection of Offices* (1658). He occasionally visited London, where he numbered among his friends John Evelyn, to whom he wrote many admirable letters still extant, as well as Boyle, George Berkeley, afterwards first Earl of Berkeley, and Wilkins. In 1658 he was given by the Earl of Conway a lectureship at Lisburn in Ireland, and at the Restoration he was made bishop of Down and Connor, to which was added next year the small adjacent see of Dromore. By Ormonde's recommendation he was elected vice-chancellor of the university of Dublin, and in February 1661 he was admitted a member of the Irish privy-council. There were many stubborn Presbyterians in his diocese who mocked at his authority, and tormented his gentle spirit, but we need not believe that the plot to take his life existed anywhere else than in his active imagination. In his first visitation he ejected thirty-six ministers from their churches, but neither severity nor gentleness could prevail to force a form of religion upon an unwilling people. His last years were clouded also by domestic sorrows. His eldest son, an officer in the army, was killed in a duel; the second passed from Trinity College to become the favourite companion and secretary to Buckingham, and died a few days before his father. The three daughters of his second wife alone survived him. He died at Lisburn after a ten days' fever, 13th August 1667, and was buried in the choir of the cathedral at Dromore, largely rebuilt by his own munificence.

Jeremy Taylor's beauty of person corresponded to the beauty of his character and the large charity of his temper. Good portraits are abundant, several he himself gave as frontispieces to his writings; one of the best hangs in All Souls College, Oxford. Bishop Heber endorses Parr's description of Hooker as the object of our reverence, Barrow of our admiration, but Jeremy Taylor of our love. He was above all things a preacher, and that especially of personal holiness. The thread of ideas is ever clear and simple underneath all his exuberant fullness and the stately march of his sentences, and though it is difficult to conceive of a congregation capable of following his argument and illustration in their full detail, all the haste and indistinctness of argument, the quaint, pedantic, and even grotesque irrelevances of illustration are fused together into harmony in the orator's glowing earnestness and fire. No poet ever excelled Jeremy Taylor in exquisite feeling for the sights and sounds of nature; he has no rival in lofty and impassioned prose save Milton alone—'Most eloquent of divines,' says Coleridge, 'had I said of men, Cicero would forgive me, and Demosthenes nod assent.'

The first collected edition of his works was that of Bishop Heber, with an excellent Life (15 vols. 1820-22); a revised edition by the Rev. C. P. Eden (10 vols. 1847–54). See Coleridge's *Literary Remains*, vol. iii. (1838); Tulloch's *Rational Theology in England in the Seventeenth Century*, vol. i. (1872); Archdeacon Farrar in *Masters in Eng. Theology* (1877); and Bishop Barry in *Classic Preachers of the Eng. Church*, series ii. (1878); also an admirable article in the *Quarterly Review* for July 1871.

Taylor, JOHN, the 'Water-poet,' as he styled himself, was born at Gloucester in 1580, and became a waterman on the Thames, but was pressed into the naval service and served at the siege of Cadiz. He collected for many years for the lieutenant of the Tower his perquisite of wine from all ships which brought wine up the Thames. When the rebellion broke out in 1642 Taylor left London for Oxford, where he kept a public-house, which he afterwards gave up for another in London, and here he hawked the doggerel which he wrote. He performed some fantastic feats of rowing, but the chief event of his life was his journey on foot from London to Edinburgh (14th July—13th August 1618). Ben Jonson thought the Water-poet's intention was to burlesque his own journey, yet when he met him at Leith he gave him a piece of gold to drink his health in England. Taylor described his journey in his *Penniless Pilgrimage* (1618); other books of the same kind were his *Travels in Germanie* (1617) and *The Praise of Hempseed*, a story of a voyage from London to Queenborough in Kent in a brown paper boat (1618). He died in 1654. Taylor's works were published under the title of *All the Workes of John Taylor the Water-poet, being sixty and three in number* (1630, folio). His poems are not destitute of natural humour, abounding with the low, jingling wit which prevailed in the reign of James I., and which too often bordered upon bombast and nonsense. Allibone's *Dictionary* contains a list of 138 articles written by the Water-poet. The best reprint of his works is a complete edition issued by the Spenser Society (1868–78).

Taylor, NATHANIEL WILLIAM, preacher and theologian, was born at New Milford, Connecticut, 23d June 1786, studied at Yale, became pastor of a Congregational church at New Haven in 1812, and in 1822 became professor of Theology in Yale College, where he taught until his death, 10th March 1858. In numerous sermons, lectures, and essays he maintained what from his pastoral charge became known as the 'New Haven theology,' long assailed as heretical. This system, a softening of the traditional Calvinism of New England, maintained the doctrine of natural ability, and denied total depravity; sin is a voluntary action of the sinner; but there is, derived from Adam, a *bias* or *tendency* to sin, which is not itself sinful. His works were edited in 5 vols. by his son-in-law, Dr Noah Porter (1858–59).

Taylor, PHILIP MEADOWS, Indian administrator and author, was born at Liverpool 25th September 1808, held a mercantile post in Calcutta, but obtained a commission in the army of the Nizam of Hyderabad, whom he served from 1826 as administrator of various large territories, one of them the tributary state of Sherapur. In this capacity he showed marvellous insight, tact, and kindliness, establishing order and justice in place of mere barbarous tyranny, and maintained peace during the mutiny of 1857. Thereafter the British government gave him charge of some of the ceded districts of the Deccan; and in 1866 he retired a colonel and C.S.I. He has left vivid pictures of Indian history, life, and manners in his romances,

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Confessions of a Thug (1839; new ed. 1858); *Tippoo Sultaun* (1840); *Tara* (the story of Sivaji, 1863); *Ralph Darnell* (1865); *Seeta* (1873); and *A Noble Queen* (1878). See his *Story of my Life*, edited by his daughter (1877; new ed. 1881).

Taylor, ROWLAND, Marian martyr, was a native of Rothbury in Northumberland, and studied at Cambridge, taking his LL.B. in 1530 and LL.D. in 1534. Cranmer, to whom he was domestic chaplain, gave him the rectory of Hadleigh in Suffolk (1544), and he subsequently became archdeacon of Exeter (1551) and a canon of Rochester. Under Mary he was imprisoned as a heretic for more than a twelvemonth in the King's Bench, and on 8th February 1555 was burned near Hadleigh. See Cooper's *Athenæ Cantabrigienses* (1858).

Taylor, THOMAS, 'the Platonist,' was born in London, 15th May 1758, went three years to St Paul's School, next studied mathematics and classics under private teachers, but, betwixt an imprudent marriage and the pinch of poverty, found it impossible to realise his dream of completing his studies at Aberdeen with a view to the ministry, and entered Lubbock's bank as a clerk. But he still found six hours in every day for study, and at length left his desk to teach private pupils and fill the office of assistant-secretary to the Society for the Encouragement of Arts, &c. During his last forty years he lived in a small house at Walworth, immersed in Plato and the Platonist philosophers, and partly supported by a gift of £100 a year from Mr Meredith, a retired tradesman with ideas, and here he died, November 1, 1835. His fifty works include translations of the Hymns of Orpheus, and parts of the works of Plotinus, Proclus, Pausanias, Apuleius, Maximus Tyrius, the Greek mathematicians, Iamblichus, Hierocles, Porphyry, &c., besides complete translations of Plato (nine, however, of the Dialogues by Floyer Sydenham, 5 vols. 1804) and Aristotle (11 vols. 1806–12). Mr W. E. A. Axon in a biographical and bibliographical sketch (privately printed, 1890) gives a list of forty-eight books, but does not include *The Spirit of All Religions* (Amst. 1790), which expresses his strange polytheistic creed.

Taylor, TOM, journalist and playwright, was born in 1817 at Sunderland, and passed from the Grange School there in 1831 to Glasgow University, and thence in 1837 to Trinity College, Cambridge, where he graduated as third classic in 1840, and was elected to a fellowship. Professor for two years of English language and literature at University College, London, he was called to the bar of the Inner Temple in 1845, for a short time travelled the northern circuit, and from 1850 to 1872 was first assistant-secretary and secretary to the Board of Health, and then secretary to the Local Government Act Office. From 1846 onwards he wrote or adapted upwards of a hundred pieces for the stage, of which may be mentioned *Our American Cousin*, *Still Waters Run Deep*, *The Ticket of Leave Man*, and *Twixt Axe and Crown*. He also edited the autobiographies of Haydon and Leslie, completed the latter's *Life and Times of Reynolds*, translated *Ballads and Songs of Brittany* (1865), and in 1874 succeeded Shirley Brooks as editor of *Punch*. He died at Wandsworth, 12th July 1880.

Taylor, WILLIAM, 'of Norwich,' was born there in 1765, the only son of a rich Unitarian merchant, and was educated at Palgrave by Mrs Barbauld's husband. At fourteen he entered his father's counting-house, but next year was sent on the first of two visits to the Continent, where he mastered French, Italian, and, more especially, German. The French Revolution at once indoctrinated him with democratic ideas and began the ruin of his father's business, which by 1811 was completed by American 'repudiation' and a stockbroker's bankruptcy; Taylor had meanwhile turned wholly from commerce to literature. His is the credit of introducing to English readers the poetry and drama of Germany, mainly through criticisms and translations contributed to periodicals, and collected in his *Historic Survey of German Poetry* (3 vols. 1828–30). Other works by him were *English Synonyms Discriminated* (1813) and a *Life of F. Sayers, M.D.* (1823). He died at Norwich in March 1836. George Borrow, his pupil in German, has sketched in *Lavengro* his philosophy, scepticism, and inveterate tobacco-smoking; and his correspondence with Southey, Scott, Mackintosh, Godwin, &c. is given in J. W. Robberds' memoir of his *Life and Works* (2 vols. 1843).

Taylor, ZACHARY, a distinguished general and twelfth president of the United States, was born in Orange County, Virginia, 24th September 1784. His father had been a colonel in the war of independence, and removed to Kentucky in 1785, settling near Louisville. Here Zachary lived on a plantation until 1808, when he entered the army as lieutenant. In 1812 as captain he commanded Fort Harrison on the Wabash, and in September with only fifty men, two-thirds of whom were on the sick-list, successfully defended that post against a large body of Indians. After further service on the north-western frontier Taylor became major, but at the close of the war being reduced to a captaincy he resigned his commission. He was soon reinstated and again employed against the Indians, and in 1832 fought with Black Hawk, the noted chief of Illinois. In 1836 Taylor, now colonel, was ordered to Florida, where previous commanders had suffered in reputation from their vain attempts to subdue the troublesome Seminoles. Taylor had the good fortune to defeat the savages at Okeechobee Swamp on Christmas Day 1837, and thus won the brevet of brigadier-general. In 1840, being placed in command of the army in the south-west, he removed his family to a plantation at Baton Rouge, Louisiana.

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When Texas was annexed in 1845 its western boundary was not defined, and Mexico still claimed the uninhabited district between the Rio Grande and the Nueces. Taylor, being ordered to defend Texas from invasion, sailed from New Orleans to Corpus Christi, where he gathered a force of 4000 regulars. Though well aware that President Polk wished him to occupy the disputed district, he would not cross the Nueces until express orders came in March 1846. He then marched to the Rio Grande and erected Fort Brown opposite the Mexican town of Matamoros. The Mexicans ordered him to retire, and upon his refusal crossed the Rio Grande to drive him out. Their action enabled President Polk to declare that the United States had been invaded, and to call for volunteers to repel the foe. But the battles of Palo Alto and Resaca de la Palma on the 8th and 9th of May drove the Mexicans back, and Taylor following seized Matamoros. The volunteers did not come to his aid until September, when he marched to Monterey, and after a severe struggle captured it on the 24th. After seven weeks' vain waiting for more troops the march was resumed. The city of Victoria was occupied on December 29, but the line of communication was found too long for the meagre force, while Polk's Democratic administration, fearing the rising fame of Taylor, who was a Whig, crippled him by withholding reinforcements.

Taylor was already falling back to Monterey when his regulars were taken from him to form part of the new expedition under General Scott. Santa Anna, the ablest Mexican general, learning

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of Taylor's weakened condition, believed that with his 21,000 veterans he could crush the 5000 American volunteers. After a march of hundreds of miles, he overtook Taylor near the mountain-pass of Buena Vista. Availing himself of its natural advantages, Taylor on the 22d of February 1847 completely repulsed the Mexicans with a loss thrice as great as his own. In the following November General Taylor returned home and was received with enthusiastic expressions of popular favour. In June 1848 the convention of the Whig party, passing by its great political leaders, selected him as the candidate for the presidency. A few Free Soilers refused to support him as being a slaveholder, but his character, indicated by the sobriquet of 'Rough and Ready,' endeared him to the masses. He was triumphantly elected in November and inaugurated in the following March. The fierce struggle over the extension of slavery to the newly-acquired territory had begun. The congress was Democratic and opposed the admission of California as a free state, while the president favoured it. To avert the threatened danger to the Union Henry Clay introduced his famous compromise, which called forth a stormy discussion. Taylor remained firm and impartial, though his son-in-law Jefferson Davis was the leader of the extreme pro-slavery faction. Before a decision was reached in congress President Taylor died suddenly of bilious fever, 9th July 1850.

General Taylor was of medium height, stout and swarthy. He was plain in manners and speech, and careless in dress; he rarely wore uniform, and often sat sideways on his horse. His ability as a commander is shown by his unvarying success in battle, and is attested by General Grant, who served under him as lieutenant. Though Taylor had taken little part in political strife, he carried off the prize which great party leaders failed to win. As president he showed himself a true promoter of his country's welfare. There are Lives by J. Frost (1848) and J. R. Fry and R. T. Conrad (1848).

Tayport, a watering-place and police-burgh of Fife, on the south side of the entrance of the Firth of Tay, opposite Broughty-Ferry (q.v.), and 3½ miles E. by S. of Dundee. Pop. (1891) 2829.

Tchad, LAKE. See TSAD.

Tchelyuskin. See CHELYUSKIN.

Tcherkask (Old Tcherkask), a town of South Russia, formerly the capital of the Don Cossacks, on the right bank of the Don, 12 miles S. of Novotcherkask (q.v.), the present capital. Pop. 15,000—TCHERKASY, or TCHERKASK, a town of Russia, 190 miles by rail SE. of Kieff, on the Dnieper. Pop. 15,470.

Tcherkesses. See CIRCASSIANS.

Tchernigoff, or CHERNIGOV, capital of a Russian government, near the Desna River, 85 miles NE. of Kieff; pop. 19,000.—The *government* has an area nearly twice as large as Belgium; see RUSSIA.

Tchernozem. See BLACK EARTH.

Tchernyshevsky, NIKOLAI GAVRILOVITCH (1828–87), Russian revolutionary writer. See NIHILISM.

Tchuktchis. See SIBERIA.

Tea (*Camellia theifera*, Griff.) is a plant of the genus Camellia (q.v.), natural order Ternstrœmiaceæ, of which there are two well-known varieties: (1) *C. theifera*, var. *assamica*, or Assam tea; and (2) *C. theifera*, var. *sinensis*, or China tea. There is no evidence that tea is wild in any part of China. The only part of the world where tea is really known to grow wild is in the forests of Assam. The Assam variety, known as 'indigenous' tea, is a tree of vigorous growth attaining a height of 30 to 40 feet, with a leaf from 8 to 10 inches in length. The China variety is a comparatively stunted shrub, though hardier, growing to a height of 12 to 15 feet, with a rounder leaf about 3½ inches in length, and calyx covered with soft short hairs. These two varieties have resulted in a hybrid which combines the hardy character of the China with the other features of the indigenous, now largely cultivated on the hills of India and Ceylon, and known as 'hybrid-Assam.' At low elevations where the climate is tropical the indigenous, or a hybrid nearly approaching it, is preferred. It is probable that the Chinese variety is the indigenous, changed by climate and cultivation. The hybrids vary much in productiveness, and the planter is careful in selecting a good strain, which grows and foliates freely without seeding. The branches are smooth.

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China Tea (*Camellia theifera*), young shoot with flowers: *a*, fruit. (Bentley and Trimen.)

The leaves are serrated and have a bright shining surface, are rather thin, but often tough and leathery. The flowers are often handsome, usually white, and are about 1¼ in. in diameter; sometimes solitary, sometimes clustered in masses; they have very short flower-stalks or no stalks at all. The fruit is rather short, of a leathery or woody consistency; dry, not fleshy. Inside it is divided into three to five three-celled chambers. Linnæus gave the name *Thea sinensis* to the Chinese variety of the tea-plant, but afterwards made two species, *T. bohea* and *T. viridis*, under the impression that black and green tea were the products of different plants. Mr Fortune was the first to show that both kinds of tea were made from the same shrub. The Chinese name for tea is *tcha*, in the Fuh-kien dialect *té* or *teh*.

The tea-plant will flourish in all parts of the tropical and subtropical zones where the rainfall is over 60 inches and evenly distributed throughout the year, In Ceylon (lat. 7° N.) it grows from sea-level to an altitude of 7000 feet. At a low elevation the growth of the plant is more rapid, but in time the high-grown tea seems to produce as much leaf as the average of low-country estates, while the tea is of more delicate flavour, though

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inferior in strength. At Darjeeling (27° 3′ N. lat.) it grows at 7000 feet above sea-level. In China and Japan it is cultivated to the 40th degree N. lat. At Auckland, New Zealand (36° 50′ S. lat.), it grows in the Domain gardens. At Natal (30° S. lat.) it is regularly cultivated, and the tea is of good flavour and strength. One circumstance, however, rules the successful production of tea—the price of labour. Roughly speaking, it may be said to take the labour of one man a day to produce a pound of tea. In Ceylon the daily pay of a coolie man is 8d., children and women being paid from 4d. to 6d. Hence it is evident that no country where labour is dear can compete with countries like India, Ceylon, Java, and China, where labour is cheap.

The tea-plant is not particular as to soil, but it succeeds best on new forest-land containing plenty of humus. Belts of forest should be left for shelter in windy situations, and a reserve of forest for firewood and timber for chests is most important. If the machinery in the tea-factory can be driven by water-power a great economy is effected by saving fuel. As is the case with cacao, coffee, and other economic plants, tea grown on rich alluvial soil is stronger than tea grown on poorer land, though the latter is often of more delicate flavour. Tea-factories range in value from £200 to several thousand pounds; some are lighted by electric light. Tea-making goes on night and day in the busy seasons.

Cultivation.—The clearing is made by cutting the undergrowth with heavy socket-knives, after which the forest-trees are felled and the largest branches lopped; six weeks afterwards the wood is burned. In Ceylon this is done by contract for 20 rupees per acre. Tea is planted in rows from 3½ to 5 feet apart, with a similar distance between the plants; 4 × 4 feet being a favourite distance, which gives 2722 plants to the acre. The tea-seed is soaked in water, and planted in shaded nursery beds; when the plants are about 4 inches high they are transplanted to the holes in wet weather during the monsoons. When plants are scarce the seed may be sown at stake in the holes, but nursery plants are generally preferred. The clearing is roaded and drained as soon as possible. On the rich deep soils of Assam manuring is not practised. In Ceylon the favourite manures are cattle-dung, castor-cake, bones, nitrogenous manures, and those which contain potash. When the plants have been in the ground about fifteen to eighteen months they are cut down to 10 or 12 inches; this makes them spread, and strengthens the growth of the branches. In about two months the more vigorous shoots are nipped back below the second leaf, thus taking off the terminal leaf-bud and first and second leaves, which makes the axillary bud at the base of the third leaf develop a fresh shoot. At first plucking is rather a matter of pruning than of gaining leaf, but as the trees become stronger the plucking becomes more regular and heavier. At about three years the bush is again cut down to some 15 inches flat across, so as to leave two joints of new wood above the last pruning. In subsequent prunings all bark-bound wood must be removed, along with whippy branches which do not 'flush' or develop fresh shoots. The plucking is done with the thumb-nail, and the leaf must on no account be torn off. Only the youngest and most tender leaves are plucked; and the younger the leaf, the finer the tea. The largest leaves used are never more than 2½ inches long. The estate must be plucked in regular rotation every ten days or a fortnight. When tea is flushing well a good coolie can bring in from 20 to 30 lb. of green leaf in a day.

In China the cultivation of tea is very different from the Indian and Ceylon system. There are no large gardens, the tea being grown in small fields and on hillsides. The leaf is plucked from the latter part of April to the end of October. The small farmer imports coolie labour for the purpose from the more populous districts. The grower does not manufacture the leaf himself, but sells it green in the local market at the nearest head village. The green leaf is bought by the agents of Chinese capitalists, who have hongs where they manufacture and pack the leaf. The finest pickings are described as first chop, the next as second chop, and so on. The hong-man ships the tea in boats, and sends it down the rivers uninsured. Before the tea is exported it has to pay the imperial Chinese customs export duty, which amounts to 1½d. the pound; the lekin duty is nearly as heavy.

Chinese teas may be classified thus: Monings or black leaf teas are grown in the north of China, and shipped from Hankow and Shanghai. They come from the following districts: Ningchow (mostly bought for Russia), Kintuck, Keemun (shipped chiefly to England), Kutoan, Ichang, Oopack, Oonam, Oonfa, Ly Ling, Cheong-sow-kai, Hohow, Siangtam. Green teas are shipped from Shanghai, and consist of Gunpowder, Imperial, Hyson, Young Hyson, and Twankay. Kaisows or Red-leafs are grown farther south, and are shipped from Foo Chow. The different kinds which take their names from the districts in which they are grown are Seumoo, Panyong, Paklum, Pakling, Padrae, Saryune, Sucy Kut. From Foo Chow are also shipped Souchongs, which are a distinct kind from Congous, and are principally drunk in Germany and Austria. Fancy teas, consisting of Oolongs, Flowery Pekoes, and Scented Orange Pekoes, are exported from Foo Chow. Canton exports Congous called New-makes, Scented Capers, and Scented Orange Pekoes.

The United States and Canada consume nearly all tea exported from Japan, the estimated supply in 1891 being 47,000,000 lb. The teas exported from Japan are of light character, mostly Oolongs and greens. The total quantity of tea imported into the United States was, in 1888–89, 79,575,984 lb., and in 1889–90, 83,886,829 lb.

Manufacture.—The first process is to spread the green leaf thinly on hessian trays in the withering house, where it is exposed to a free current of air—a very important operation, which takes from 12 to 48 hours. When the leaf is tough and flaccid, like an old kid glove, it is ready for rolling. Withering is assisted by fans which circulate currents of dry air. The old or Chinese system of rolling was to place the withered leaf on a table where it was rolled by hand to and from the coolie till the juice was expressed and the leaf well twisted; this took about 20 minutes to do. The Chinese accomplish this partly by the dirty process of treading. Now this process is performed by machinery, and in India and Ceylon tea is not manipulated after plucking. In Jackson's 'Excelsior' and 'Rapid' tea-rolling machines in general use in India and Ceylon the leaf is rolled between two superposed plates of hard wood or polished granite, actuated by cranks which give them a compound circular or eccentric motion. These machines are driven by steam or water power, but there is a smaller roller for hand power. Both the 'Excelsior' and 'Rapid' rollers are capable of taking a charge of from 240 to 300 lb. of withered leaf, they effect a great saving in labour, do the work far more thoroughly than by hand or foot pressure, and ensure perfect cleanliness. Some planters sift the rolled leaf through sieves with ¼-inch meshes and re-roll the leaf which is too large to pass through. Considerable diversity of opinion exists as to

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whether tea should be rolled lightly or hard: the former gives a prettier tea with more of the golden 'tip;' the latter gives a stronger liquor, and the tea keeps better. The rolled leaf is now ready for fermentation, an operation requiring close attention. It is placed in drawers or on tables and covered. The state of the weather hastens or retards the process; in hot dry weather the leaf will be sufficiently fermented or oxidised in 20 minutes, in cold wet weather it may take hours. Whenever the leaf assumes a bright copper colour it must be fired; over-fermentation is a fatal error. The difference between black and green teas is simply this: if the tea is fired immediately after rolling it is green tea, if it is fermented it becomes black tea. The old system of firing was to have iron gauze trays fitting over V-shaped chula furnaces about 30 inches high, and to dry the tea over charcoal fires. Now drying is done quicker and better by machines for the purpose, such as the 'Sirocco,' consisting of a stove portion and drying chamber, through which a powerful air-current passes; and by this means the wet leaf is dried thoroughly in 6 to 8 minutes. Other machines are known as the 'Britannia' and the 'Desiccator.' Jackson's 'Victoria' and 'Britannia' driers are highly recommended, and Brown's desiccator is well spoken of in Ceylon. After firing the manufacture is complete, and the tea is what is known as 'unassorted,' which contains all the different grades into which tea is usually separated. In this state it is a most excellent tea for drinking, but it is customary to sort it into different grades before sending it to market. The old system of doing this was by using hand sieves of different sizes. The 'dust' was taken out by the finest sieve; the 'broken pekoe' or finest and youngest leaf by the next; the 'pekoe' by a sieve with wider meshes; the 'pekoe souchong' by the next larger; if 'souchong' is made a still larger meshed sieve is employed. Sorting by hand sieves is still done in small factories, but in large factories machinery is used. Jackson's 'Eureka combined tea sorting and cutting machine' is in general favour. Before the final packing the tea is taken from the bins in which it is kept and re-dried to expel any moisture which it may have absorbed from the atmosphere. It is then weighed into lead-lined chests, half-chests, or boxes, and soldered up, the name of the garden is stencilled on the packages, and it is ready for export. Chests usually contain 100 lb. of tea, half-chests from 45 to 50 lb., and boxes 20 lb. The 'brick tea' prepared at Hankow for overland exportation to Russia is made of tea-dust steamed and pressed into cakes, which occupy only one-sixth of the bulk of loose tea. A coarser kind, made of tea-leaves, stalks, and refuse of the tea-dust cakes, is sent to Mongolia, where for use it is boiled with mutton fat and butter. The Burmese eat pickled tea with fish, &c.

History.—De Candolle states that tea was known to the Chinese before 519 A.D.; a Chinese legend says tea was introduced into China by Djarma, a native of India, about 500 A.D. Tea first became known to Europeans about the end of the 16th century. Small quantities were brought to England early in the 17th century, but it was not till about the year 1657 that it began to be used as a beverage, when Garraway opened a tea-house in Exchange Alley; the price then was from £10 to £5 per lb. Pepys, writing on 28th September 1660, says: 'I did send for a cup of tee (a China drink) of which I had never drank before.' Two years later he writes: 'Home, and there find my wife making of tea, a drink which Mr Pelling the Pothicary tells her is good for her cold and defluxions.' In 1678 the English East India Company imported 4713 lb.; in 1725 370,323 lb. were drunk in England; in 1740 the prices ranged from 7s. to 24s. per lb.; in 1775 the consumption was 5,648,000 lb.; in 1801, 23,730,150 lb. In 1840–90 the consumption in the United Kingdom has been (1840) 32,000,000 lb., (1850) 51,000,000, (1860) 77,000,000, (1870) 110,666,390, (1880) 158,571,000, (1890) 194,008,000; and it has increased from 1·22 lb. per head in 1840 to 5·07 lb. in 1890. In 1840 the duty was 2s. 2¼d. per lb.; in 1858, 1s. 5d. per lb.; in 1865, 6d.; and in 1890, 4d. per. lb.

About 1820 the plant was discovered wild in Assam, and was again noticed in 1823. The attention of the East India Company having been called to the expediency of introducing tea into India, a commission was sent to China in 1834 for this purpose. It was, however, recalled when Dr Griffith and Dr Wallish proved tea to be growing wild in Upper Assam between the Naga and Mishmee mountains on the upper part of the Brahmaputra River. The same year the Company commenced the industry at Kumaon with plants brought from China. In 1835 the first garden in Assam was opened at Luckimpore, from which a small quantity of tea was sent to England in 1838. In 1840 the Assam Tea Company was started, and in 1843 India tea offered for sale in London fetched from 2s. 6d. to 3s. per lb. The first garden of indigenous tea was planted by the Assam Company in 1840, and the value of the variety was gradually recognised; though large quantities of China plants and seed were imported in 1848 and 1851. The industry in its early days passed through many vicissitudes, but the perseverance of those engaged in the cultivation was attended by success. There are now about 312,000 acres under tea cultivation in India, the leading districts being Assam, Cachar, Sylhet, Darjeeling, Dooars at the foot of the Darjeeling Hills, Dehra Dun, Kumaon, and Kangra, Chota Nagpore, Chittagong, the Neilgherry Hills, and Travancore. Export of tea from India (year ending 31st March 1886), 69,666,116 lb.; (1887) 80,557,329 lb.; (1888) 88,982,346 lb.; (1889) 99,339,868 lb.; (1890) 105,609,533 lb.; (1891) 101,903,655 lb.

Tea was introduced into Ceylon in 1839. In 1867 Mr James Taylor opened the first clearing on Loolcondura for Messrs Keir, Dundas, & Co., but it was not till 1874–75 that the cultivation became common. On the failure of coffee from the 'leaf disease' fungus about 1881 and onwards there was a rush into tea, and the staple cultivation of the colony was changed. In 1867, 10 acres were under tea; in 1877, 2720 acres; in 1887, 170,000 acres; in 1891, 223,000 acres. The exports were (1873) 23 lb.; (1877) 2105 lb.; (1880) 162,575 lb.; (1884) 2,392,973 lb.; (1888) 23,820,723 lb.; (1889) 34,346,432 lb.; (1890) 45,390,086 lb.; (1891) 68,274,420 lb. As in Southern India, there is no winter in Ceylon and vegetation receives no check, hence tea is made more or less in every month of the year. The crop in Natal is about 300,000 to 400,000 lb., and is consumed in the colony, Free States, and Transvaal. The tea is of fair quality when made by experienced planters, having something the character of Ceylon. Java ships tea of taking appearance but often of weak liquor. In 1888–89 the export was 7,659,000 lb., and in 1889–90 7,056,000 lb. About 70,000 acres are planted. China teas were formerly much adulterated with foreign leaves, various mineral substances, sand, quartz, magnetic oxide of iron, soapstone, &c. These were cleverly made up so as to resemble the various kinds of tea with starch, and were known as 'lie tea.' Dr Hassall found from 8·32 to 24·94 per cent. of mineral matter in caper; in siftings, 15·32 per cent.; in gunpowder, 8·49 to 33·49 per cent. Infused tea-leaves, redried, were also commonly used. Thanks to the care taken in the laboratory at the London Custom

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House, adulteration may be said to be a thing of the past to the English consumer, as the detected teas are not allowed to pass into use in Britain, though they may be again shipped abroad. Mineral matters are, however, still allowed for facing purposes to the extent of 2 per cent., the object of facing being to improve the appearance of inferior tea. The substances used are generally Prussian blue, indigo, soapstone, and plumbago. The caper tea, much used in Leicestershire and the midland counties, is faced with plumbago. Foreign leaves are easily detected by macerating in hot water and examining under the microscope. In twenty years only two samples of Indian teas have been found subject to adulteration.

Consumption.—The consumption of tea in the principal tea-drinking countries of the world where statistics are obtainable is thus calculated (in lbs.) by Messrs Gow, Wilson, & Stanton to be—

	Average Annual Consumption during 5 years (1880–84).	Average Annual Consumption during 5 years (1885–89).	Duty.
Great Britain	170,733,600	183,218,620	4d.
United States	71,175,814	79,178,100	Free.
Russia	62,408,500	70,543,866	2d.—11½d.
Australian Colonies	18,200,000	21,488,920	8d.—6d.
Canada	16,600,000	18,849,450	Free.
Holland	4,860,878	5,178,694	2½d.
New Zealand	3,902,000	4,800,000	6d.
Germany	3,113,500	3,975,882	5½d.
Cape Colony	1,128,500	1,169,892	8d.
France	1,000,000	1,168,817	9d.—11½d.
Argentine Republic	900,000	1,200,000	6½d.
Austria-Hungary	739,500	1,071,925	8½d.—9d.
Tasmania	699,500	873,098	8d.
Denmark	733,800	798,806	8d.

Messrs George White & Co. of Fenchurch Street give the following comparative table of imports of tea (in thousands of lbs.) into the United Kingdom:

Season.	India.	Ceylon.	China.	Total Imports.
1875–76	25,500	·2	149,000	174,500
1880–81	45,250	278	164,500	210,028
1885–86	67,250	5,361	143,000	215,611
1886–87	78,500	8,667	134,000	221,167
1887–88	86,750	15,614	119,500	221,864
1888–89	94,500	27,899	92,500	214,899
1889–90	100,685	84,290	89,900	224,875
1890–91	100,983	50,192	69,743	220,918

Chemistry.—As a beverage, the refreshing qualities of tea are well known. It exhilarates the system, dispelling fatigue and sleepiness, and stimulates the mental powers. These properties are generally believed to be due chiefly to the active principle theine, though the evidence on this point is not clear. We find tea in great favour with weak and old persons, also among the poor, who find that by using tea they consume less solid food. But if tea is used to excess it produces flatulent indigestion, increased pulsations of the heart, and nervousness; the imagination is excited, and sleeplessness follows. These conditions cause a certain degree of fatigue, which induces the patient to have recourse to tea again to brace up the system, as drunkards resort to spirits in the morning for a similar purpose. It is difficult to determine how much tea can be safely drunk daily, the effects on different constitutions being unlike. Johnston considered that 3-4 grains of theine may be taken daily without bad effects, but that double this quantity may be injurious. Dr Bennett (*British Medical Journal*, 1874) found theine was poisonous for cats and rabbits in doses of rather over one grain for every pound-weight of the animal. In medicine theine is used in cases of opium-poisoning, for nervous headaches, to relieve stupor in fevers, and as a sedative of the vascular system; it has also a considerable diuretic action. Theine can be obtained from the infusion of manufactured tea by crystallisation. It is odourless, white, and has a slightly bitter taste. It is generally considered to be identical with caffeine, though this has lately been questioned. It occurs very irregularly in tea, but is found to a greater degree in Indian and Ceylon than in China and Java teas, as is shown in analyses by Dr Paul and Mr Cownley (*Pharmaceutical Journal*, November 19, 1887, and July 26, 1890). From these analyses it appeared that the theine in different kinds of dry Ceylon tea varied from 4·89 to 2·57 per cent., in Indian tea from 4·89 to 3·86, and in Chinese tea it ranged from 3·78 to 2·42.

Tannin is an important constituent of tea, which gives the astringent properties to the infusion. It is generally admitted by chemists that tannin to a great extent regulates the commercial value of tea. Those teas which are rich in tannin give a stronger and darker liquor, and are consequently in greater demand. Tannin precipitates both albumen and peptone, and in this way doubtless hinders digestion. It also stops secretion from the mucous membrane, and so retards the pouring out of the digestive products; otherwise it probably has no effect, when given in small doses as in infusions of tea, on normal persons. When tea is allowed to stand five minutes before pouring off the infusion, which is the time allowed by tea-tasters, probably only one-fifth of the tannin is extracted. But when allowed to stew a long time, as is too often the case in poor households, a much larger percentage of tannin is extracted. Though Indian and Ceylon teas contain more tannin than China teas, it does not follow that the drinker of the former absorbs more tannin into his system than the drinker of the latter, as much less Indian tea is required to make a cup of tea. The percentage of gluten in tea is of little importance. Sometimes the results of analysis are stated for gluten and at other times for albumen, of which it is a form. Albumen (and gluten) is, however, rendered insoluble by boiling water, and so probably remains entirely in the tea leaves. If any were dissolved in the infusion it would probably become a food, like white of egg, fibrin, and other albumens. As yet chemistry throws but little light on the volatile oil contained in tea. Nor is it definitely known whether any of the ordinary effects of tea are due to it. It is possible that it may have something to do with the peculiar flavour of certain teas. The following plan of tea-making for household use is worth attention. Bring the water to the boil, but do not let it boil longer or the water hardens. Use a liberal quantity of tea, and pour over it as much water as you consider will make all the tea you require. Let it stand for three minutes and pour into a fresh (warmed) tea-pot. Five minutes is the longest time the water should remain on the tea.

See *The Tea Cyclopædia* (1881); Colonel E. Money, *Cultivation and Manufacture of Tea* (Lond. and Calcutta, 1878); Johnston's *Chemistry of Common Life* (new ed. 1879); the present writer's *Subtropical Cultivations* (1886); W. G. Stables, *Tea, the Drink of Pleasure and Health* (1883); Owen, *Tea-planter's Manual* (Colombo, 1886); A. M. and J. Ferguson's *Tropical Agriculturist, Tea Culture and Preparation, Tea-plucking Illustrated* (Colombo, various years); and Rutherford's *Ceylon Tea-planter's Note-book* (1889).

Teak (*Tectona grandis*), one of the most valuable timbers known, is the wood of a large deciduous tree (natural order Verbenaceæ) with leaves from 10 to 20 inches in length, and from 8 to 15 inches in breadth. The tree, which has small white flowers in panicles, is found in Central and Southern India, where, however, it is now scarce in some localities in which it was formerly plentiful. There are extensive forests of it in Burma and Siam, and it extends into Java and some neighbouring islands. In India growing teak is placed under the management of a conservator of forests,

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and very little is now exported from that country. The wood is of a quiet yellow colour, tending to brown, and like many other kinds of timber has a characteristic odour. It is classed as a hardwood, though it is only of medium hardness, taking, however, a good polish; and it is straight grained and strong. Although easily worked when not long cut down, it readily blunts tools after being kept some length of time. Its average specific gravity when dry is about 585. Teak does not shrink much in seasoning, and it is believed to expand and contract less by differences of temperature than most woods. Unless very thoroughly seasoned it has some tendency to split, and this is perhaps its chief defect. It is much less resinous than some other well-known hardwoods, such as mahogany and rosewood, but it is usually said to contain an aromatic essential oil which prevents iron in contact with it from becoming rusted, and for this reason it is always used for the backing to the armour-plates of ships of war. A sticky elastic extract, to some extent resembling india-rubber, is obtained from teak by treating the wood with naphtha or ether. It is probably this which is the real cause of the wood preventing iron from rusting. The pores of the wood are sometimes filled with a white substance, which has been ascertained to be phosphate of lime (calcium phosphate). There is a high percentage both of this substance and of silica in the ash of teak, and this no doubt explains why carpenters and other tradesmen consider it gritty. White ants rarely attack the wood if it is sound, but nevertheless logs of it are often badly worm-eaten; these, however, are rarely sent to Europe, and are believed to be derived from unhealthy trees. Teak wood varies considerably in quality even when perfectly sound.

In India teak is used for all kinds of work where strength and durability are required, such as for building ships, houses, and bridges; also for the construction of railway carriages and furniture. In England it is largely employed in shipbuilding, and to some extent for architectural purposes, such as shop fronts, as well as for furniture. It has numerous minor applications. The leaves of the tree yield a red dye. Being of large size they are used in India for plates and for thatching. The great increase in the consumption of teak in recent years shows that the wood is much appreciated for its valuable properties. In 1890 the imports into Great Britain were 60,182 loads, value £680,162; while in 1880 they only amounted to 33,800 loads.

African teak (*Oldfieldia Africana*) is imported from the west coast of Africa; it is also a valuable timber, but less so than true teak.

Teal (*Querquedula*), a genus of very small ducks with numerous widely distributed species. The

Common Teal (*Querquedula crecca*), male and female.

Common Teal (*Q. crecca*), a beautiful bird measuring 14 inches in length, is comparatively abundant in Britain, breeding freely in the east and north of England, and throughout Scotland and Ireland. Its nest is usually built on the margin of a lake or among heather; it is made of grasses and leaves and lined with down. The bird feeds chiefly at night on worms, slugs, insects, and seeds. The Garganey (*Q. circia*) is also a British species, but is much less common, and breeds regularly only in Norfolk and Suffolk. It is larger than the common teal, the adult male measuring 16 inches. The Green-wing Teal (*Q. carolinensis*) of North America closely resembles the common teal, the females of the two species being hardly distinguishable from each other.

Tears usually consist of pure water, with saline traces; but in cases of poisoning may show the poison, and in diabetes become saccharine like the other secretions. The lachrymal apparatus is described at EYE, Vol. IV. p. 509. Serving normally to moisten eyeballs, interior eyelids, and nose, they are regularly secreted in normal quantities, and disappear by the duct into the nose. Where there is spasmodic contraction of the muscles about the eye, as in fits of coughing, yawning, or immoderate laughter, the tears are squeezed out from the eyelids and run down the cheeks. In man they are also the natural outlets of strong emotion, and are secreted in greatly increased quantity; they much more constantly accompany crises of fear, anxiety, grief, affection, and keen joy than physical pain. Old age is comparatively tearless. Some animals, especially deer, are credited with weeping tears of grief. Darwin says few animals shed tears at all; he failed to notice weeping in monkeys, but records Emerson Tennent's opinion that elephants weep with sorrow, as supported by the keepers of tame elephants. See Darwin's *Expression of the Emotions* (1873).

Teasel (*Dipsacus*), a genus of plants of the natural order Dipsaceæ. This order consists of herbaceous and half-shrubby exogenous plants, with opposite or whorled leaves, and flowers in heads or whorls, surrounded by a many-leaved involucre. There are five known genera and 125 species comprised in the order, all natives of the temperate parts of the Old World. In the genus Dipsacus the flowers are separated from each other by long, stiff, prickle-pointed bracts. The only valuable species of the order is the Fuller's Teasel, or Clothier's Teasel (*D. fullonum*), a native of the south of Europe, naturalised in some parts of England. It is a biennial, several feet high, with sessile serrated leaves, the stem and leaves prickly; and with cylindrical heads of pale or white flowers, between which are oblong,

Fuller's Teasel (*Dipsacus fullonum*): a, a bract.

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acuminated, rigid bracts, hooked at the point. The heads are cut off when the plant is in flower, and are used in woollen factories, and by fullers and stocking-makers, for raising the nap on cloth. No mechanical contrivance has yet been found to equal teasel for this purpose, to which the hooked points, the rigidity, and the elasticity of the bracts are admirably adapted. The heads of teasel are fixed on the circumference of a wheel or cylinder, which is made to revolve against the surface of the cloth. Teasel is cultivated in many parts of Europe, and is imported into Britain, but is cultivated to some extent in England, particularly in Somersetshire and Yorkshire. The seed is sown in March, on well-prepared, strong, rich land, and the plants thinned out to a foot apart; in August of the second year the heads are ready to be cut. The flowers of teasel abound in honey, and the seeds are used for feeding poultry. The root was formerly in use as a diuretic and sudorific.

Teb, EL, 50 miles SSE. of Suakin, was the scene, on 29th February 1884, of General Graham's defeat of Osman Digna's forces, that victory being preceded by Baker Pasha's defeat near Tokar (4th February), and succeeded by the second British victory of Tamanieb (13th March).

Technical Education, of such a kind as best to fit the youth of the country for their work in after life, is especially necessary in the case of those on whose work depends the material welfare of the nation—artisans, foremen or employers, farmers or merchants or commercial travellers. The public interest in the subject was aroused by the fact that in 1881, when a Royal Commission was appointed to consider the question, education in Britain was in this respect very much behind that provided in such countries as France, Germany, and the United States of America.

The methods of technical education are necessarily different in different countries. On the Continent the growth of the industrial system has accompanied or rather followed that of the technical schools. These have thus been able to render very great direct assistance to the industries; while even the injurious effect of compulsory military service has been much diminished by the inducement to higher technical study involved in the offer of a shortened period of service to students who have passed successfully through a technical school. In Britain long-continued industrial supremacy has led to a well-developed industrial organisation in which the old opportunities for the trade education of apprentices in the workshops have largely disappeared, and their place is only now being filled by outside teaching. In Britain, moreover, the difficulty of reorganisation is increased by the power of trade societies, which insist upon the letter of the apprenticeship period although its spirit is gone.

In the earlier stages of education the aims and the conditions are practically the same in all countries. The subjects of instruction and the methods of teaching must be such as will best train the intelligence, the observing and reasoning powers, and pave the way for manual dexterity. In the teaching of arithmetic every opportunity must be taken to connect figures with facts, and pupils must be accustomed to solve the simple problems of price and measurement that are of constant occurrence in daily life. English language and composition is not only valuable as a medium for literary culture, but it is technical in so far as it leads to the accurate description of an object, a process, or an event, or to the full understanding of such a description. Drawing offers a ready means of training the hand and eye; while modelling and the use of tools are valuable aids in this important relation. The accurate study of common things ought to form an essential part of the training of the pupils who have to acquire habits of inquiry; it is also the foundation of that familiarity with properties of materials which is the basis of good work in the industries. It is this study of common things which is known as 'Elementary Science' in school programmes. Throughout the elementary stage of education it is the method as much as the matter that constitutes the claim of the work to be described as technical.

In Britain the higher stages run along two parallel lines—the one for pupils who devote their time to systematic study, and for these the teaching is carried on in day classes; the other for pupils who spend the day in work in a trade workshop, in an office, or in the field, and for whom only the evenings are available for instruction in sciences—in the principles underlying their daily work and in languages. Considering day classes first, we find in every town of considerable size secondary schools adapted to the needs of boys from thirteen to sixteen years of age. In most of these adequate instruction is given in technical and commercial arithmetic, in mathematics, and in modern languages. In many towns there are also technical schools in which the training includes moreover free-hand and mechanical drawing, handicraft, and the branches of science that are likely to be of most advantage to the pupils—applied mechanics, steam, electricity for engineering students; chemistry and agriculture for agricultural students, and so on. The great majority of the pupils attending these schools pass from them directly to work, and continue their education by attendance at advanced evening classes, or by attending advanced day classes for a year or two after completing an apprenticeship. Some, however, give up a year or more, when they are from sixteen to eighteen years of age, entirely to study before taking up practical work. This course is followed mainly in industries such as engineering, mechanical or electrical, chemical or textile manufactures, or agriculture, where the processes involve applications of principles which can be fully understood only by those who have studied a fairly wide range of science. The advanced classes for the instruction of such students are to a large extent of a practical kind; much of the work is done in laboratories. All colleges for such work require fully equipped chemical, physical, mechanical, and engineering laboratories, workshops for wood and iron, as well as a full complement of appliances for teaching art, the principles of agriculture, or such other departments of applied science as are required by the students in attendance. It is also desirable that the students should have facilities for continuing their language studies and for becoming familiar with book-keeping and commercial practice. After a course of study such as is provided in a technical college of this kind the students are in a position to benefit very readily by the experience they will have in the manufactory or office or on the farm. They will have thoroughly mastered the principles, and have learned something of the modes of their application, so that they enter upon their work with their eyes open alike to the possible causes of failure and to likely avenues of advance.

For the benefit of students who are unable to devote their entire energy to study up to the age of eighteen, or even up to sixteen, evening classes have been established throughout the country in which the work ranges through the standards described here as secondary and advanced. It is thus possible for a lad who leaves school for a trade at the age of thirteen or fourteen to continue his studies by attending evening classes, and he will find that by diligent work for four or five

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years he may complete the secondary stage of his education, while three or four more will enable him to become familiar with that theoretical knowledge whose applications he has been practising all these years. This prolonged course is required only for those who would fit themselves for any promotion that may be open to them; for the less ambitious a shorter course suffices. For all, however, it is now realised that what is first wanted is a thorough grasp of elementary principles such as will enable a man to make the most of the experience and deftness he acquires in the course of his practical work.

The scope of the technical education required for each of the thousand-and-one occupations of the day is, according to the British view, limited by the accepted conclusion that the best place for a young man to learn the practice of his trade or business is in the workshop or office, as the case may be. But while this is so it is also recognised that there are many matters of general knowledge essential to the due understanding of this practice, many questions of materials, design, principles, and methods which it is nowadays quite impossible for a beginner to be instructed in during business hours, and which can be both more economically and more efficiently taken in hand by an organisation specially charged with such work. A technical school may thus be complete without any teaching of a trade. In fact, in Britain, trade teaching in schools or colleges has been suggested only in the case of a few special industries, and to a certain extent in others for youths in exceptional circumstances.

On the continent of Europe and in America the provision for the technical education of workmen and foremen is not in most respects in advance of that now made in Britain. For masters and managers, however, there have been in active operation for many years numerous technical schools, supported almost entirely by the several states, housed in palatial buildings, equipped with costly and extensive laboratories and museums, and conducted by staffs of professors and teachers so numerous as to admit of the utmost subdivision of the subjects taught. Reporting in 1884, the Royal Commissioners on Technical Instruction declare 'that they had been much impressed with the general intelligence and technical knowledge of the masters and managers of industrial establishments on the Continent. They found that these persons, as a rule, possessed a sound knowledge of the sciences upon which their industry depended, and that they were familiar with every new scientific discovery of importance, and appreciated its applicability to their special industry. They adopted not only the inventions and improvements made in their own country, but also those of the world at large, thanks to their knowledge of foreign languages and of the conditions of manufacture prevalent elsewhere.'

The great proportion of important inventions and improvements in industrial processes that are due to British manufacturers shows that there have ever been men who secured their own technical education when there were little or no apparent facilities for it. A complete system of technical education will widen the area from which such industrial leaders may arise. It will increase the number of those who, having the intelligence and tact essential in a foreman, have also the technical knowledge required to enable them to understand new work. And it will give workmen, in addition to the expertness which retains for them a large share of the markets of the world, the ability to enter into their work with intelligence, with pleasure, and with ambition.

See the Reports of the Royal Commissioners on Technical Education (1884; explaining the systems in use in various countries); vol. ii. of the *Proceedings* of the International Conference (Lond. 1884); the publications of the National Association for the Promotion of Secondary and Technical Education; the reports and prospectuses of the several technical schools; MacArthur, *Education in its relation to Manual Industry* (New York, 1885); C. H. Ham, *Manual Training* (New York, 1886); Sir Philip Magnus, *Industrial Education* (1888); also the articles POLYTECHNIQUE, EDUCATION, ART (INSTRUCTION), SLOYD; and for the part taken by the county councils in promoting technical education, see Ashby, *Manual of the Guild and School of Handicraft* (1892).

Technology, the systematic knowledge of the industrial arts, represented by innumerable articles in this work, such as those on spinning, weaving, calico-printing, the manufactures of cotton, woollen goods, silk, the making of the several metals, gas, sulphuric acid, bread, beer, wine, &c.

Teck, an ancient principality named from a castle on 'the Teck,' a limestone peak in the Swabian Alb, 20 miles SE. of Stuttgart. Held by various families from the 11th century on, it passed in 1498 to the Dukes of Würtemberg. In 1863 the king of Würtemberg conferred the principality on Duke Albert of Würtemberg's son (born 1837), who in 1866 married the Princess Mary of Cambridge. Their daughter, Princess May, was engaged to be married to the Duke of Clarence, who died 14th January 1892.

Tecumseh (or *Tecumtha;* 1768–1813), chief of the Shawnees (q.v.), who headed the rising suppressed by Harrison in 1811, and passing into the English service commanded the Indian allies in the war of 1812–13 with the rank of brigadier-general. He was killed fighting bravely at the Thames in Canada. See the monograph by Eggleston (New York, 1878).

Teddington, a town of Middlesex, on the left bank of the Thames, 13½ miles (by water 18½) SW. of London. Pop. (1861) 1183; (1891) 10,025.

Te Deum (*Te Deum laudamus, Te Dominum confitemur*), a well-known Latin hymn of the Western Church—so called from its first words—sung at the end of matins on all feasts except Innocents' Day, and on all Sundays except during penitential seasons. The hymn is one of the most simple, and at the same time the most solemn and majestic, in the whole range of Latin hymnology. Its authorship is uncertain. The chronicle of Bishop Datius of Milan (died *c.* 552), which unhappily is both unauthentic and worthless, describes the Te Deum as the joint production of St Ambrose and St Augustine, into which they both burst forth by a common inspiration on occasion of the baptism of Augustine. Hence the Te Deum is commonly called the Ambrosian Hymn. The first actual reference to it is in the rule of Cæsarius of Arles, who was made a bishop in 502, and it is at any rate certain that it arose as early as the 5th century, and in its modern form was used by Hincmar of Rheims in the 9th century. It is ascribed by some authorities to Hilary of Arles, by others to some disciple of Cassian of Marseilles, but in no case is the evidence at all satisfactory. The hymn in its current form consists of twenty-nine verses; the first twenty-one verses are uniform in the four oldest versions current, and it seems probable that verses 1–10 were a Greek hymn dating back to the 2d century, although Bishop John Wordsworth in Mr Julian's *Dictionary* thinks verses 7–9 are a reminiscence of Cyprian, not *vice versâ*, and that the Greek form of verses 1–10 is a translation from the Latin, not an original composition. In the Anglican morning prayer it follows the first Lesson, except when the Benedicite is preferred as its alternative. It is frequently used also in the

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services of both Presbyterian and Congregationalist churches, and there are more than twenty metrical renderings of it in English hymnology.

See the Rev. John Julian's *Dictionary of Hymnology* (1892), and Prebendary Edgar C. S. Gibson in *Church Quarterly Review* for April 1884.

Tees, a river in the north of England, rising on Cross Fell, Cumberland, and flowing 70 miles eastward, mainly along the boundary between Durham and Yorkshire, till it falls into the North Sea, 4 miles below Stockton. Owing to works carried out since 1853 it is now navigable to that town for vessels of large burden, those works including the construction of two breakwaters at the mouth.

Teeth, hard bodies in the mouth, attached to the skeleton, but not forming part of it, and developed from the dermis or true skin. 'They present,' says Owen, 'many varieties as to number, size, form, structure, position, and mode of attachment, but are principally adapted for seizing, tearing, dividing, pounding, or grinding the food. In some species they are modified to serve as formidable weapons of offence and defence; in others, as aids in locomotion, means of anchorage, instruments for uprooting or cutting down trees, or for transport and working of building materials. They are characteristic of age and sex; and in man they have secondary relations, subservient to beauty and to speech. Teeth are always intimately related to the food and habits of the animal, and are therefore highly interesting to the physiologist; they form, for the same reason, important guides to the naturalist in the classification of animals.'

True teeth consist of one, two, or more tissues, differing in their chemical composition and in their microscopical appearances. 'Dentine,' which forms the body of the tooth, and 'cement,' which forms its outer crust, are always present; the third tissue, the 'enamel,' when present, being situated between the dentine and cement. The *dentine*, which is divided by Owen into hard or true dentine, vaso-dentine, and osteo-dentine, consists of an organised animal basis, disposed in the form of extremely minute tubes and cells, and of earthy particles. The tubes and cells contain, besides the calcareous particles, a colourless fluid, which is probably transuded blood plasma, or *liquor sanguinis*, and contributes to the nutrition of the dentine. In hard or true dentine the *dentinal tubes* proceed from the hollow of the tooth known as the *pulp cavity*, in a slightly wavy course, nearly at right angles to the outer surface. 'The hard substance of the tooth is thus arranged in hollow columns, perpendicular to the plane of pressure, and a certain elasticity results from these curves; they are upright where the grinding surface of the crown receives the appulse of the opposing tooth, and are horizontal where they have to resist the pressure of contiguous teeth. The tubuli also receive the plasma transuded from the remains of the vascular pulp, which circulates by anastomosing branches of the tubuli through the dentine, maintaining a sufficient though languid vitality of the system. The delicate nerve-branches on the pulp's surface convey sensations of impressions affecting the dentine—sensations of which every one has experienced the acuteness when decay has affected the dentine, or when mechanical or chemical stimuli have "set the teeth on edge."' When a part of the primitive vascular pulp from which the dentine is developed remains permanently uncalcified, red blood is carried by 'vascular canals' into the substance of the tissue. Such dentine is called *vaso-dentine*, and is often combined with true dentine in the same tooth, as, for example, in the large incisors of certain rodents, the tusks of the elephant, and the molars of the extinct megatherium. When the cellular basis is arranged in concentric layers around the vascular canals, and contains 'radiated cells,' like those of bone, this is termed *osteo-dentine*, and resembles true bone very closely. The *cement* always corresponds in texture with the osseous tissue of the same animal, and wherever it occurs in sufficient thickness, as on the teeth of the horse or ox, it is traversed like bone by vascular canals. Moreover, when the osseous tissue contains minute radiated cells, precisely similar cells are likewise present in the canal, and constitute its most marked characteristic. The relative densities of dentine and cement vary according to the amount of earthy matter. In the complex grinders of the elephant and some other animals the cement, which forms nearly half the mass of the tooth, wears down sooner than the dentine. The *enamel* is the hardest of all the animal tissues, and contains no less than 96·4 per cent. of earthy matter (mainly phosphate of lime), while dentine contains only 72 per cent., and cement and ordinary bone only 69 per cent. of earthy matter. The earthy matter is contained in comparatively wide canals, composed of animal membrane of extreme tenuity.

Fig. 1.—Vertical Section through a Tooth lodged in its socket:

a, enamel; *b*, dentine; *c*, crusta petrosa, or cement; *d*, lining of the cavity in the gum; *e*, bony socket in gum; *f*, pulp cavity.

In a few fishes the teeth consist of a single tissue—a very hard kind of non-vascular dentine. Teeth consisting of dentine and vaso-dentine are very common in fishes. Dentine and cement constitute the grinding teeth of the dugong. In the teeth of the sloth the hard dentine is reduced to a thin layer. 'The human teeth and those of the carnivorous mammals appear at first sight to be composed of dentine and enamel only; but their crowns are originally, and their fangs are always covered by a thin coat of cement. There is also commonly a small central tract of osteo-dentine in old teeth. The teeth called compound or complex in mammalia differ as regards their composition from the preceding only by the different proportion and disposition of the constituent tissues. Fig. 2 is a longitudinal section of the incisor of a horse; *d* is the dentine, *e* the enamel, and *c* the cement, a layer of which is reflected into the deep central depression of the crown; *s* indicates the coloured mass of tartar and particles of food which fills up the cavity, forming the "mark" of the horse-dealer.' Far more complex forms of teeth than this may be produced by peculiar arrangements, chiefly inflections, of the tissues (see LABYRINTHODONTS). Another kind of complication is produced by an aggregation of many simple

Fig 2.—Longitudinal Section of the Incisor of a Horse.

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teeth into a single mass, as in some fishes and a few mammals. The teeth of the Aard-vark (q.v.) are of this kind, each tooth being composed of a congeries of long and slender prismatic denticles of dentine, which are cemented together. In the elephant the compound molars belong to this class, the denticles being in the form of plates vertical to the grinding surface, and transverse to the long diameter of the tooth.

The teeth of *fishes*, in regard to their number, form, substance, structure, situation, or mode of attachment, offer a greater and more striking series of varieties than do those of any other class of animals. In all fishes the teeth are shed and renewed, not once only, as in mammals, but frequently during the whole course of their lives. Tortoises and turtles, toads, and certain extinct Saurians are toothless. Frogs have teeth in the upper, but not in the lower jaw. Newts and salamanders have teeth in both jaws and upon the palate; and teeth are found on the palate as well as on the jaws of most serpents. In reptiles, as a general rule, the base of the tooth is anchylosed to the bone which supports it. The completion of a tooth is soon followed by preparation for its removal and succession, the faculty of developing new tooth-germs being apparently unlimited in this class. The extinct Odontornithes (q.v.) are the only birds with teeth. Of mammals there are a few genera and species devoid of teeth. The true ant-eaters, the pangolins, and the echidna are strictly toothless. The ornithorhynchus has horny teeth, and the whales have transitory teeth, succeeded in the upper jaw by whalebone. The Narwhal (q.v.) has a peculiar development. The elephant has never more than one entire molar, or parts of two, in use on each side of the upper and lower jaws; to which are added two tusks, which are modified incisors, more or less developed, in the upper jaw. The boar's tusks are large and powerful canines. Some rodents have two grinders on each side of both jaws, which, added to the four cutting-teeth in front, make twelve in all; but the common number of teeth in this order is twenty, although hares and rabbits have twenty-eight each. The number of teeth, thirty-two, which characterises man, the apes of the old world, and the true ruminants, is the average one of the mammals. The dentition is often summarised as to the number and position of incisors, canines, molars, and premolars, thus: the *dental formula* of the typical mammal is *inc.* $\frac{2}{2}$-$\frac{2}{2}$, *can.* $\frac{1}{1}$-$\frac{1}{1}$, *pm.* $\frac{3}{3}$-$\frac{3}{3}$, *m.* $\frac{3}{3}$-$\frac{3}{3}$ = 44; or more briefly $\frac{2}{2}\frac{1}{1}\frac{3}{3}\frac{3}{3}$. The absent teeth may be denoted by $\frac{0}{0}$ or by a blank. The dentition is indicated in the articles on the several animals where it is of interest (especially at HORSE), and in the articles on the great groups of animals (see, for example, CARNIVORA). Dolphins may have 200 teeth. (Compare the number of teeth on the tongue of the common garden snail; 135 rows of 105 teeth each—14,175 in all.) It is only in the mammals that we have a well-marked division of the teeth into the four kinds of incisors, canines, premolars, and molars, each of which claims a brief description.

The *incisors*, or cutting-teeth, are situated in front, and possess a single conical root or fang, and a vertical crown bevelled behind, so as to terminate in a sharp cutting edge. These teeth are specially fitted, as their name implies, for cutting the food. In man there are two of these incisors in each side of each jaw (in the pre-maxilla). The permanent incisors, molars, and premolars are preceded by a set of deciduous or *milk* teeth, which are lost before maturity, and replaced by the permanent ones. In herbivorous animals they crop the herbage; in rodents (the rabbit, hare, rat, beaver, &c.) these teeth are very much developed, and differ from any other teeth occurring in mammals in this respect, that their growth continues throughout life; and if their length does not constantly increase, it is because their free extremity or edge

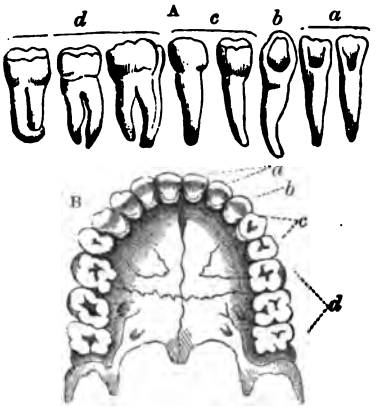

Fig. 3.

A, the separate human teeth as they occur in the half-jaw of the adult; B, the human teeth *in situ* in the upper jaw; *a*, *a*, incisors; *b*, *b*, canines; *c*, *c*, premolars; *d*, *d*, true molars.

is worn down by trituration as fast as they grow at the base from their roots.

The *canines* (so called from their prominence in the dog) come next to the incisors. Their crown is rather conical than wedge-shaped, and their fang sinks more deeply into the jaw than in the case of the incisors. In all carnivorous animals they are largely developed, being obviously formed for tearing the flesh of their prey. In man there is one canine tooth in each half-jaw; and there is never more than this number in any of the lower animals.

The *premolars* (known also as bicuspids and false molars) come next in order to the canines; they are smaller than the latter, and their crown presents two pyramidal eminences. In man there are two premolars in each half-jaw. Their function more nearly approaches to that of the true molars behind them, than to that of the canines.

The *true molars* (or multicuspids) are placed most posteriorly. They are remarkable for their comparatively great size, the square form of the upper surface, on which are from three to five elevations or cusps, and for their short root, which is divided into from two to five branches, each of which is perforated at its extremity. They appear first in the permanent set. In man there are three molars in each half-jaw, the posterior one being termed the wisdom-tooth, from its being cut the latest; they are especially employed for grinding the food, under the action of the muscles of the lower jaw.

The teeth are so admirably adapted for the special purposes which they are called upon to fulfil that it is generally easy, from a careful examination of them, to say to what class of animals they belong, and to draw various conclusions regarding the habits and structure of the class generally. Thus, in carnivorous animals the molars are not grinding-teeth, but present sharp cutting edges, and those of the upper and lower jaw overlap each other, resembling a pair of scissors in their action. In insectivorous animals the molars have a tuberculated surface, with conical points and depressions, so arranged as to lock into each other. In frugivorous animals, living on soft fruits, these teeth are provided with rounded tubercles, while in herbivorous animals they have a broad, rough surface, resembling a millstone.

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There is also a close connection between the articulation or joint of the lower jaw and the nature of the food used by the animal. Thus, in purely carnivorous animals, in which the teeth simply tear and cut the food, no grinding motion is required, and the jaw is capable only of a simple hinge-motion in the vertical plane; while in herbivorous animals the joint is so constructed as to allow of extensive sliding and lateral motion of the lower molar teeth upon the upper. In man both the form of this articulation and the general character of the teeth point to an intermediate position in relation to food, and form a physiological argument for the mixed diet which general custom has decided to be most natural to our species.

See the articles CARNIVORA, DOG, RODENTIA, SKULL, for illustrations of teeth *in situ;* and besides general works on anatomy, human and comparative, Owen's *Odontography* (1845) and other works, and Flower's *Osteology of the Mammalia* (1886).

DISEASES OF THE TEETH.—Decay (*Caries*) is by far the most common of the diseases which affect the teeth, and consists in a gradual and progressive disintegration of the tooth-substance. Among the chief predisposing causes are hereditary defects of quality; imperfect calcification; pits and grooves in the enamel; overcrowding of the teeth; facilitating the retention of particles of food between them, constitutional disorders; chiefly those affecting the digestive organs; and debilitating causes generally —e.g. over-exertion of nervous and mental energies. The exciting cause of caries has recently been proved by Professor Miller of Berlin to be due to the action of micro-organisms. According to him, 'the first stage of dental caries consists in the decalcification of the tissues of the teeth by acids which are for the greater part generated in the mouth by fermentation,' the agents concerned in the process being micro-organisms and the acid they produce—lactic acid.

Decay is rarely met with on smooth surfaces exposed to the friction of food and the direct washings of the saliva. It usually begins in some pit or groove in the enamel or between the teeth, such points forming a lodgment for the development of the organisms. Once the enamel has been penetrated the decay proceeds more rapidly, spreading laterally beneath the as yet healthy enamel and towards the pulp. The more dense the structure of the tooth the more directly does the decay penetrate in the direction of the pulp, although its progress is not so rapid and its tendency to spread is less. Caries is most common in early life, by far the greater number of cavities making their appearance between the ages of six and eighteen. Its colour varies from pale brown to black, and generally the lighter the colour the more rapid is the decay. Pain may be felt soon after the enamel has been penetrated, or may be delayed until the nerve (pulp) has become almost or quite exposed; yet, strangely enough, it is sometimes altogether absent, particularly in very hard teeth. When the pulp has become nearly encroached upon, the patient's sensations will warn him against taking hot or cold, sweet or acid fluids. Ultimately the pulp becomes exposed, when the pain increases and may become very violent, especially if the nerve be pressed upon by food forced into the cavity by mastication. Should this take place the pulp becomes acutely inflamed and soon dies, when the pain may either cease or go on till an alveolar abscess is formed. The treatment of caries can only be undertaken by the dentist, and varies with the extent and character of the disease. See DENTISTRY.

Periostitis and Alveolar Abscess.—Periostitis is an inflammation of the membrane (periosteum) which covers the roots of the teeth and lines their sockets. It may be either general or local. When general the majority or all of the teeth are commonly involved. Periostitis of this type is usually due to constitutional causes (such as rheumatism), or the effects of some such agent in the system as mercury, or the presence of accumulated tartar about the necks of the teeth. When the disease is local—confined to one or two teeth—it may result from a blow or some such injury, or it may proceed from an inflamed pulp; but by far the most common cause is the presence of a dead nerve, the poisonous products of which are liable at any time to cause violent inflammation at the end of the root. Yet it is not uncommon to find that teeth whose pulp dies and whose substance gradually breaks down and decays away do not give rise to any trouble. When acute periostitis has fairly set in, it and its usual accompaniment, alveolar abscess, are perhaps the most painful affections to which the teeth are subject. The symptoms vary in intensity, though the characters remain the same. A dull aching pain is felt, and is relieved at first by pressure upon the affected tooth; as the inflammation increases in severity the tooth rises slightly in its socket, and becomes exquisitely painful when bitten upon; the gum around it becomes congested, and the throbbing pain is almost continuous.

Alveolar Abscess may be defined as a suppuration around the root or roots of a tooth. It is of two varieties, *acute* and *chronic*. Its causes are those of periostitis, which precedes it, the continuous and throbbing nature of the pain indicating the formation of matter (pus) within the surrounding bone. The face, with the glands about the neck, swell, and the glands exhibit tenderness on touch. The pent-up pus forces its way through the bone to reach the surface of the gum at the point of least resistance, which is most often opposite the end of the root or roots (this is popularly known as a 'gum-boil'). It occasionally finds its way along a canal by the side of the root, and discharges at the edge of the gum. Sometimes the discharge burrows downwards to find an exit on the face. This is almost peculiar to the lower teeth, and calls for removal of the tooth affected. With the escape of pus by 'gum-boil' there is a marked abatement in the intensity of the pain, which generally disappears in a few hours and the swelling in a few days. If left to itself, however, the abscess soon assumes the chronic form, the tooth becoming almost if not quite comfortable. This condition may continue for an indefinite period, but there may also be a recurrence of the symptoms in a milder form. Not unfrequently chronic abscesses occur without giving rise to any pain, the only evidence of their existence often being a small fistulous opening on the surface of the gum, from which from time to time pus discharges. Even this last may be wanting. If the abscess resist all treatment, the disease can be cut short by the extraction of the tooth, although many cases can be successfully treated and the tooth rendered permanently useful.

Exostosis is characterised by an increase in the thickness of the cementum, the external of the two hard tissues forming the roots of the teeth. Its forms vary from a small nodule or patch to a quantity sufficient to invest the entire root or roots of the same or adjoining teeth. It is most often caused by slight but continued irritation of the periosteum by caries, or by rapid wearing of the masticating surfaces. Occurring as it sometimes does in teeth otherwise sound, its diagnosis is difficult; its presence may not be suspected till an attempt is made to extract the tooth, which, owing to the enlargement of the fangs, cannot even when loosened be removed without great difficulty. Exostosis may often cause neuralgic pains about the jaws.

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Impaction and difficult Eruption of the Wisdom and other Teeth.—It is not uncommon to find certain of the temporary teeth firmly set in the adult jaw, and occupying the place of the permanent ones. In such cases the permanent tooth is usually present in the body of the jaw, but it has been retarded in eruption by being too deeply imbedded in the bone. Impaction may also be due to an abnormal direction of growth. Such teeth may appear late in life after all the others are lost, and the bone overlying them has been absorbed and so exposed them. When these cases do occur they are responsible for the popular but incorrect idea of a third set of teeth. An impacted tooth seldom gives rise to any trouble, unless it be an upper or lower wisdom, *particularly* the latter. The cutting of these teeth is sometimes accompanied by distressing symptoms which may be protracted for months or years, unless they are removed by extraction of the tooth. This condition is usually due to imperfect development of the jaw. The tooth usually takes its natural vertical direction, but, being wedged in between the tooth in front and the ascending portion of the jaw behind, only a small portion of the crown is visible. The overlying gum is apt to be bruised by the occlusion of the opposing tooth in the upper jaw; inflammation is thereupon set up, and being maintained by biting may extend to the surrounding parts. Swallowing becomes painful and the motion of the jaws restricted. When it is evident that there is insufficient accommodation in the jaw for the erupting tooth it should be removed.

Inflammation of the Gums, although not a disease of the teeth proper, is one of the most common causes of their premature loss. It may arise from constitutional causes—chronic dyspepsia, rheumatism or gout—or from the administration of such drugs as mercury or iodide of potassium. Most often, however, it results from the presence of tartar about the necks of the teeth, and lack of thorough cleansing. When due to constitutional causes, their appropriate remedies are called for; but when due to the presence of tartar, this deposit should be carefully removed. See DENTISTRY (*Scaling*).

Absorption of the Alveoli.—The gradual wasting of the bone which surrounds and supports the roots of the teeth, accompanied by a simultaneous recession of the gums, is one of the changes which mark the approach of old age. This wasting may, however, occur in middle life without any visible cause, although the majority of such cases are due to chronic inflammation of the gums, with or without the deposition of tartar. Heredity, or the use of too hard a tooth-brush, may likewise be accountable. The teeth most affected are the front ones; but the reverse of this is not unusual. The gums, especially in front, gradually recede and lay bare the roots; the teeth now become loosened and finally drop out. The treatment consists in the removal of any obvious source of irritation; but when the disease is due to heredity nothing can be done to arrest its course.

Abrasion of the Teeth is a gradual loss of their substance from causes which are purely mechanical. The more common cause is a faulty occlusion of the jaws, but it is also produced by the improper use of the tooth-brush. When the result of malocclusion, it shows itself upon the grinding surfaces of the back teeth and the cutting edges of the incisors, which may become rapidly worn down almost to the gum, the rate of progress being frequently hastened by the common habit of grinding the teeth together. When caused by improper brushing it is seen on the front surfaces.

Erosion of the Teeth, on the other hand, though closely resembling the second form of abrasion, is understood to be due to the secretion of a corrosive acid by the labial glands. It is first seen near the gums as a small concave depression with a smooth polished and often very sensitive surface continuous with the front of the tooth. As it progresses, the pulp recedes, throwing out successive layers of protective dentine until it becomes entirely calcified. The disease can generally be arrested by filling, preferably with gold or porcelain inlays.

Diseases of the Antrum, while springing from other sources, are often caused by diseased teeth. The cavity in the bone of the upper jaw, known as the Antrum of Highmore, communicates by a small opening with the nose, and is sometimes the seat of inflammation set up by the presence of an abscess in connection with one of the back teeth, the roots of which project into it. The most common symptom of such a condition is an offensive discharge from the nostril of the affected side, increased in quantity when the patient lies down. The treatment is very tedious, much depending upon the age and general health of the patient; it consists in the removal of any diseased teeth from the affected side. This extraction may be followed by a discharge of pus; if not, an opening into the antrum should be made through the socket of one of the roots, and the cavity drained, suitable stimulating and disinfecting lotions being injected by means of a syringe till a healthy condition is established. Among the less common forms of disease which attack the teeth and gums are necrosis, dentigerous cysts, odontomes, epuloid and polypoid and other tumours of the jaws, and diseases of the tooth-pulp itself. These, however, are so comparatively rare as to be of no interest to the general reader.

Toothache is not so much a disease as a symptom. Its chief causes are mentioned under *Caries* and *Alveolar Abscess*. The pain, which varies greatly in degree, character, and duration, depends largely upon its cause, and the health of the patient at the time of the attack. Only a transient uneasiness may in some instances be felt, and, as often, in others almost insupportable agony. If neuralgic in character it most frequently occurs in paroxysms at more or less regular intervals. When toothache is due to caries with or without simple exposure of the pulp, the attack is brought on by taking hot or cold, sweet or acid fluids, and is seldom of long duration. To afford relief in such cases as these, gently wash out the cavity with a solution of carbonate of soda; then, drying it carefully with a piece of cotton-wool, take a very small pellet of wool dipped in eucalyptus oil and place it in the bottom of the cavity; over this place a piece of cotton-wool large enough to fill the cavity and saturated with the following solution: 1 drachm of mastic in 1½ ounce of Eau de Cologne. This should be changed daily. When the pain is caused by the forming of an alveolar abscess the tooth will be found insensitive to change of temperature but very susceptible to pressure. The patient now becomes feverish, and the pain, which is at first of a dull heavy character, becomes more intense, throbbing, and continuous, till pus has been formed and discharged through the gum. Provided the tooth is likely to prove useful and the patient cannot consult a dentist, the gum should be carefully painted with tincture of iodine, or the old-fashioned plan of placing a roasted fig over the root may be resorted to; at the same time it is well to give an aperient such as Epsom salts, followed by a full dose of quinine—6 to 8 grains for an adult. Great relief follows this treatment, which is, of course, only temporary. If an abscess shows signs of pointing upon the gums it may with advantage be lanced. Poultices *must never* be applied to the face, for heat tends to draw

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the pus outwards. Abscesses in connection with the lower wisdoms often assume a very serious character unless cut short by extraction of the tooth.

Hygienic Care of the Teeth.—Many of the diseases of the teeth and gums might be prevented or greatly retarded by proper attention to the cleansing of these organs. The implements best fitted for this purpose comprise the quill toothpick, waxed silk thread and brushes, with suitable powders. The toothpick ought to be used after *every* meal, but it should be supplemented by the use, between the teeth, of floss silk, which will remove deposits accumulating where contiguous teeth touch. The brush is used to remove all deposits solid and mucous, and it gives the teeth a bright and polished appearance; its mechanical friction too stimulates the gums to more healthful action. An excellent tooth-powder is composed of precipitated chalk, 2 ounces; light magnesia, 2 ounces; oil of cinnamon, 8 drops; thymol crystals, 4 grains; otto of roses, 10 drops. The teeth should be brushed twice daily, in the morning and in the evening. The manner of using the brush is more important than many people suppose. The general method is to brush horizontally, but a moment's reflection will show that this leaves untouched the very situations most in need of cleansing. The brush, used properly, should be pressed against the teeth and the handle rotated so as to make the bristles sweep vertically between and over them; this, coupled with an up-and-down motion, will thoroughly cleanse the interspaces; the inner surfaces of the back teeth are best cleaned in a like manner, while the corresponding parts of the upper and lower incisors are effectually reached by a vertical drawing movement. The brush should be of medium texture, and the bristles of unequal length, and not too closely placed. A hard-and-fast rule cannot, of course, be laid down for everyone to follow, but in the majority of cases it is advisable to use the powder in the morning and a mouth-wash with the brush in the evening. For the latter purpose the following is good (especially where a tendency to inflammation exists)—tannic acid, 4 grains; rose water, 1 ounce; tincture of pyrethrum, ½ drachm; oil of cinnamon, 10 drops. Over-brushing must be guarded against as carefully as under-brushing lest the gums and the necks of the teeth be injured. During an illness these precautions are doubly necessary as the corrosive effects of many medicines are then added to the evil results of a weakened vitality. The use of a glass tube in taking medicines that contain mineral acids and iron is usually supposed to be a sufficient precaution against the action of such drugs upon the teeth, but this is quite erroneous; the only sure preventative being a weak solution of ordinary baking soda, with which the mouth should be rinsed after *every* dose. The choice of a tooth-powder should be left to the dentist, for many dentifrices which, no doubt, whiten the teeth do so by the action of some agent which is as deadly to the tooth-substance as to the impurities it is meant to remove. Charcoal (so much used) is quite unsuitable because of its gritty nature. As far as the ordinary individual is concerned, the use of brush and toothpick is the limit up to which one can take care of one's own teeth, so that a thorough examination of the mouth once or twice a year by a trustworthy professional man is necessary to check the diseases of the teeth before they have gone so far as to be irreparable. Especially should this be attended to in children. It is almost impossible to overrate the importance of following, at least in the main if not in detail, the hints given above, for when we consider that the teeth are placed at the very gateway of life, it is not surprising that their neglect should be answerable for many of the disorders of the system. And surely precaution is better than cure.

For a more detailed description of the diseases of the teeth, see the works of Litch, Tomes, and Salter.

Teething, the acquirement of teeth, especially of their first teeth, by children from about their seventh month onwards, may take place in strong children without any constitutional disturbance or ailment other than some local irritation or inflammation; many of the infantile diseases once credited to teething being really due to improper feeding (see INFANTS) and neglect of hygiene. But the time of teething is more or less a critical period, especially for the nervous system of the child, and is apt to be associated, especially in sensitive children or such as suffer from rickets, with restlessness, disturbed sleep, and even in some cases with Convulsions (q.v.), diarrhœa, and eruptions. Close attention to the general health is always necessary.

Teetotalism. See TEMPERANCE.

Tegern-See, a beautiful mountain lake, 3½ miles long, in the extreme south of Bavaria, 30 miles SE. of Munich; it is a much esteemed summer-resort.

Tegethoff, WILHELM, BARON VON, Austrian admiral (1827–71). See TACTICS, p. 46.

Tegnér, ESAIAS, one of the most prominent of Swedish poets, was born at Kyrkerud, in the province of Vermland, on 13th November 1782, the son of a country pastor of peasant descent. The boy lost his father when only ten years of age, and owed his education as well as his support to the good-will of kind patrons. At seventeen he enrolled himself a student at Lund University, and graduated, as first student of his year, in 1802; a few months later he was appointed a lecturer in the faculty of philosophy. It was not until 1808 that he attracted any attention as a poet; but the stirring *War-song for the Militia of Scania* made his name known, and the patriotic appeal, *Svea* (1811), made it famous. In the following year he was chosen professor of Greek. The best creations of his poetic genius all belong to a comparatively short period of time (1817–25)—*Song to the Sun* (1817), *Epilogue on the Degree Day at Lund* (1820), *The Candidate for Confirmation* (1820), *Axel* (1821), and *Frithiof's Saga* (1825). After this he only wrote occasional pieces and a couple of incomplete poems of a more ambitious cast. In 1824, however, he had been called to undertake the onerous duties of the bishopric of Vexiö, and to those duties he gave his strength, until symptoms of mental disease showed themselves (1840); he died 2d November 1846 (see SWEDEN, p. 9). His work is distinguished by much of the transparent clearness, tranquil ease, and artistic finish that he admired so greatly in the ancient Greeks. At the same time he writes with the warm enthusiasm, the quick poetic feeling, the freshness and vigour of a modern over whom the inspirations of romanticism had passed. And, what has contributed not the least to make him a favourite, his verse is full of melody, rich in imagery, and moves with stately grace and dignity. *Frithiof's Saga*, a cycle of epics treating of old Scandinavian days, is his masterpiece; and notwithstanding certain obvious faults, it is a noble production, one of the most popular poems in Swedish, and a welcome addition to the translated poetry of every literature in Europe. *Axel*, a romance in verse of the time of Charles XII., is more unequal in execution; the other three poems mentioned rank higher than *Axel* in technique, but do not surpass its best passages in poetic insight and inspiration. Tegnér's collected works were published in 1847–50 (7 vols.

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Stockholm), and again in 1882–85 (8 vols.). The best life is that by his son-in-law, Böttiger, prefixed to the first edition of his collected works. See also the interesting monograph (in Danish) by Georg Brandes (1878).

Tegucigalpa, the capital of Honduras, is situated in a fertile valley 3400 feet above the sea, on both sides of the Rio Grande, with mountains rising round about. It has a high school, an active trade, and a pop. of 12,000.

Tehâma. See ARABIA, Vol. I. p. 362.

Teheran, or TEHRAN, capital of Persia, 70 miles S. of the shore of the Caspian Sea. It stands on a wide plain, dotted here and there with mud-built villages, and pierced with many circular pits, which reach down to the great subterranean watercourses, on which, in this region, the life of animal and plant is altogether dependent. To the north runs in a general east and west direction the lofty range of the Elburz Mountains, rising in Demavend to the height of nearly 20,000 feet above sea-level. The old wall and ditch (4 miles long) were levelled in 1868, and the space thus gained made into a much needed circular road or boulevard. Fortifications, consisting of a bastioned rampart and ditch, were at the same time commenced on a much more extended scale. This enceinte, with its twelve gates and enclosing an area about 10 miles in circumference, was completed in 1873. The town rapidly extended beyond its old limits, more especially on the north side, where many fine streets, gardens, and buildings soon made their appearance, among which may be specially mentioned the handsome buildings and grounds of the British Legation. The Shah's palace, entirely reconstructed since 1866, occupies the Citadel, and is both spacious and cheerful, its large courtyards being laid out with gardens and numerous fountains. Besides his town palace, the Shah has five others in the immediate neighbourhood, which he occupies at different seasons of the year. The foreign legations and rich natives are also in the habit of resorting in summer to the cool slopes at the foot of the Elburz, where many of them have commodious houses and fine gardens. The bazaars, some of which are very handsome structures, are filled with every kind of native and foreign merchandise. From Teheran lines of telegraph radiate in almost every direction to the extremities of the kingdom, by far the most important being the lines of the Indian Government Indo-European Telegraph Department and those of the English Indo-European Telegraph Company. In 1886 a short line of railway was constructed from Teheran to Shah Abdul Azim, a shrine and place of pilgrimage about 6 miles to the southward of the town. Tramways were also laid down in different parts of the city; and gas was introduced (by a Belgian company) in March 1892. The population probably amounted in 1891 to 150,000, or double of what it did thirty years before. In the same period the number of Europeans increased from about 30 to 1000. In the vicinity of Teheran are the ruins of Rei, the *Rhages* of the Book of Tobit, known in the time of Alexander the Great under the name of *Ragæ* and the birthplace of Harûn-al-Raschid. See PERSIA, and works there cited.

Tehuantepec, a town of Oaxaca, Mexico, 10 miles above the mouth of the river Tehuantepec, with 25,000 inhabitants (mostly Indians) within its municipality. The isthmus on which it stands is only 120 miles wide, and a canal here between the two oceans has been dreamt of ever since Cortez' day. A concession was granted and an Anglo-American company formed in 1850; but the political insecurity of the country and the construction of the Panamá railway combined to bring it to an end. An interoceanic railway company founded in 1879 also allowed its concession to lapse into the government's hands; and Captain Eads's suggestion of a ship-railway remained, owing to his death, a project only.

Teignmouth (pron. *Tinmouth*), a seaport and watering-place of Devonshire, 12 miles (by rail 15) S. of Exeter, stands on the north side of the pretty estuary of the Teign, which is spanned by a wooden bridge (1827), 557 yards long. Burned by the Danes in 970, by the French in 1338 and 1690, it has a grassy promenade, the Din or Dune, a pier (1866), a public market (1883), baths (1883), St Scholastica's Abbey for Benedictine nuns (1865), &c. Pop. (1851) 5149; (1891) 8292.

Teinds, the name given in Scotland to tithes or the proportion of the annual produce of the earth devoted to the maintenance of the clergy. The growth of the system in Europe is recounted at TITHES. In Scotland personal teinds are practically unknown; and predial teinds, natural or industrial, drawn from the fruits of land, constitute the whole teinds leviable by the church. Predial teinds are of two kinds, parsonage and vicarage. The parsonage or greater teinds, due exclusively to the parson serving the cure, are payable out of grain at the terms Whitsunday and Michaelmas. Vicarage or lesser teinds are properly paid to the vicar, and are drawn from minor and accidental products, such as fowls, eggs, milk, fish, &c., according to the usage of each parish or benefice. Parsonage teinds being an inherent burden on the land, the right to levy them cannot be lost by prescription; vicarage teinds, on the other hand, being established both as to their kind and their amount solely by use, may be lost by non-use. By statute, 27 and 28 Vict. chap. 33, provision is made for vicarage teinds on fish being commuted.

The teinds due at common law to the incumbent of the parish had previously to the Reformation been to a large extent diverted to other purposes, with the result that the acting parochial clergy were greatly impoverished. In many cases, on a vacancy occurring in a parochial charge, the patron, acting as absolute proprietor of the benefice, appropriated its teinds to a monastery or other religious house, and although the disposal of tithes to laymen had been prohibited by several Lateran Councils, grants of part of the teinds of vacant benefices were frequently bestowed by patrons on needy lay friends and relatives. Further, a considerable proportion of teinds was diverted from the support of the parochial clergy by the practice of certain popes in granting to various orders of churchmen exemptions from the payment of tithe out of lands held by them. Soon also a custom grew up of granting feus of these church lands *cum decimis inclusis*, a provision which transferred to the grantee the same exemption from the payment of teind which the ecclesiastical proprietors had formerly enjoyed. In these various ways the revenues of the church had been extensively impaired long before the Reformation.

At the Reformation the great bulk of the church lands was acquired by the crown, either by resignation or annexation. The monasteries and priories fell at first into the hands of lay commendators, appointed by the king for life; but later they were erected into temporal lordships, the grantees being styled *Lords of Erection* or *Titulars of the Tithes*. In this way the possessions of the church were permanently transferred into the hands of laymen holding of the crown. The property of the lands erected and the right of exemption from teind, where such right existed, formed the temporality; while the teinds themselves constituted the spirituality of the benefice. For some years the

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presentations to vacant benefices were wholly in the hands of the lords of erection, and they also had the power of assigning to the presentees such stipends as they chose. Under the scheme known as 'the assumption of thirds,' however, a return was ordered of the rental of all ecclesiastical benefices within the kingdom, and factors were appointed to uplift one-third of the revenues thereof. This scheme, after being ratified by parliament, was subsequently adopted as the basis of the plan adopted for the support of the reformed clergy. By statute 1587, chap. 29, the practice of creating lords of erection received a check, and, with certain exceptions, the church lands which had been held of the crown before the Reformation were again inalienably annexed to the crown. On the restoration of bishops the annexations of their benefices and of their chapters were rescinded by 1606, chap. 9 and 1617 chap. 2 respectively; on the re-establishment of presbytery these measures were repealed by the Act 1690, chap. 29, and since that date the bishops' teinds have continued to be applied by the crown to public uses and pensions.

In spite of the assumption of thirds and other measures, the provision for the support of the reformed clergy continued very precarious till the accession of Charles I. Immediately after his accession in 1625 Charles, in view of the extent to which the property and revenues of the church had been dilapidated, executed a revocation of all grants of church lands and tithes made by James VI. to the prejudice of the crown. Next year there followed another revocation, conceived in even more ample terms, under which a reduction was brought of all erections whatever, whether made before or after the Act of Annexation. As the individuals who had profited by the prodigality of the crown were very numerous, these proceedings caused wide-spread alarm, and a strong petition or remonstrance was addressed to Charles, with the view of obtaining some modification of his demands. Eventually a compromise was agreed upon, and the parties principally concerned entered into four submissions, under which the whole question in dispute was referred to the determination of the king himself. By the decrees-arbitral, pronounced on the 2d September 1629, the king's right to the superiorities of erection was affirmed, and power was given to the heritor to have his teinds valued and his yearly charge thus permanently settled. Further, the proprietor was found entitled to bring an action of sale against the titular or his tacksman, by which he could obtain right to his teinds at nine years' purchase of the value where the seller had an heritable right. The provisions of the decrees-arbitral, relating to the superiorities of erections and the valuation and sale of teinds were subsequently ratified by a series of acts of parliament in 1633. In 1627 a commission, known as the 'Commission of Surrenders and Teinds,' had been appointed, and in 1633, for the purpose of carrying the decrees-arbitral into effect under judicial authority, another commission was nominated known as the 'High Commission' or the 'Commission for the Plantation of Kirks and the Valuation of Teinds.' These commissioners were instructed to prosecute and follow forth the valuation of all the teinds, parsonage and vicarage, that were yet unvalued; they were authorised to appoint sub-commissioners within presbyteries and parishes, and to them was committed the duty of modifying a constant local stipend to every minister to be paid out of the teinds of each parish. From time to time this commission was continued with increasing powers, or rather, a succession of commissions was kept up until at the Union their power and functions were vested in the Court of Session, where accordingly actions for the valuation of teinds now proceed at the instance either of a heritor or of the minister. The jurisdiction of the Court of Session in modifying stipends, &c. is treated under article STIPEND.

The teind was originally made effectual in Scotland as elsewhere by the beneficiary *drawing* it, that is, carrying off from the ground every tenth sheaf. This practice was very inconvenient, as the proprietor was obliged to allow the crop to remain on the ground, exposed to all the vicissitudes of the season, till the teind was drawn. Consequently, even prior to the Reformation, it was common for the beneficiary to commute his teind either for a fixed yearly payment of money or for a certain number of *rental bolls*. Teinds are *debita fructuum*, not *debita fundi*, and, consequently, arrears of teinds do not affect singular successors. Although prescription, as we have stated, cannot destroy the right to teinds, yet it is effectual to protect an old decree of valuation from challenge, except on the ground of some nullity *ex facie* apparent. The free or unexhausted teinds (i.e. such as, arising from increased rental, &c., are not yet appropriated for stipends) were in 1891 stated at about £129,000. See STIPEND, AUGMENTATION, FIARS.

Tekna, the independent country south of Morocco, extending from the Draa to Cape Bojador, inhabited by Moors and Arabs, many of them nomadic. There is one small port, Tarfaya. Cape Juby is a feature of the coast.

Telegraph (Gr. *tēle*, 'far off,' and *graphō*, 'I write'). This is a general name for any means of conveying intelligence other than by voice or by the transmission of written messages. Perhaps also the idea of speed is generally understood. Alarm fires (see BEACON), the Semaphore (q.v.), and Signalling (q.v.) as used at sea are among the earlier forms of telegraphy, but now all such agents are thrown into the shade by the electric telegraph.

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The idea of telegraphic communication by means of magnets is certainly more than two and a half centuries old. In 1632 Galileo, the great astronomer, referred to a secret art by which, through the sympathy of magnetic needles, it would be possible to converse at great distances. Again, in 1753, when a more defined idea of electricity had begun to dawn, a letter appeared in the *Scots Magazine* signed 'C. M.' (now almost certainly recognised to be Charles Morrison, a native of Greenock, who practised as a surgeon at Renfrew, from whence the letter was dated), in which 'an expeditious method of conveying intelligence' from one place to another by means of electric power was so clearly set down that we cannot but recognise that the writer must have had a considerable appreciation of the possibilities of electric communication. Many quiet workers occupied this field of research from that time until 1837, which is the generally recognised year of the birth of the electric telegraph. Limited space forbids anything but a passing reference to the work of the fathers of the telegraph. If a comparison may be made, we may say that what Wheatstone and Cooke were in the Old World, Morse and Alfred Vail were in the New. The claim that may justly be made for the recognition of the genius of either workers does not in the least militate against the recognition of that of the others; but it must be conceded that while the method originated by the English inventors has found acceptance principally in England, the Morse system is of world-wide use, and has supplanted the other even in England except for railway working, for which the needle system is most admirably suited. We must now proceed to furnish such information as will give some idea of the present state of the

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science, with some notice of the more important systems in use in Britain, together with a few general statistics. In doing this it will be necessary to assume on the part of the reader some general knowledge of the chief features of Electricity (q.v.; and see also MAGNETISM).

The general subjects dealt with occur in the following order, and it may be noted that special terms have been included and explained as far as possible. I. *Construction* —(1) lines, overhead and underground; (2) poles and insulators; (3) wire; (4) earths and earth-currents; (5) circuit; (6) batteries—universal battery. II. *Apparatus*—(1) needle system and Morse code; (2) the sounder system; (3) the Morse recorder; (4) the relay, polarised and non-polarised; (5) the double-current system; (6) type-printing instruments—Hughes's, &c.; (7) the duplex system; (8) the quadruplex system; (9) multiplex telegraphy; (10) automatic telegraphy; (11) 'news' circuits; (12) repeaters; (13) submarine telegraphy—cables. III. *Statistics.*

I. *Construction.*—(1) *Telegraph lines* may be either overhead or underground. There can never be any question when the choice is open as to the adoption of the overhead system, as not only is the first cost less, but it is better for working purposes, and faults can be easily traced and removed. On the other hand, climatic conditions do not affect underground lines, while a severe storm will sometimes do so much damage to open work as to cripple the whole system. Nearly all the wires in large towns are necessarily underground, as there are many serious objections to overhouse lines. For instance, there are more than 2600 wires led into the Central Telegraph Office in London which are almost without exception underground.

(2) *Poles and Insulators.*—Overhead wires are supported for the most part upon *creasoted* wooden poles by means of *insulators.* No hard and fast rule can be given as to the number of poles that should be used. For minor lines twenty or twenty-two may be used, but on main lines the number should be between twenty-six and thirty to the mile. Ordinarily the lowest wire on a pole should be not less than 12 feet from the ground, so that, allowing for setting in the ground (which varies from 4 feet to 6 for ordinary poles), and the *sag* or *dip* of the wire between the poles, the length of the poles used on branch lines is usually about 20 or 22 feet, and this is increased by 1 foot for each two additional wires required. The object of the insulator is to isolate the wire from any material which would be liable to conduct the current from the wire, and the material of which the insulator is made is therefore of much importance. *Glass* is a material which possesses some of the necessary qualifications in a high degree, but its extreme readiness to condense moisture, whereby it becomes coated with a conducting film, is fatal to its employment. *Ebonite* also fails in practice, and *brown earthenware* is almost the only substance that has hitherto been able to stand out as a competitor with *porcelain.* This latter is distinctly the best material to use, but earthenware has the advantage as regards price. Cordeaux's screw insulator is constructed simply to screw on the bolt so that it can be easily renewed or removed. When insulators are very subject to breakage by stone-throwing they are protected by an iron cap.

(3) *Wire.*—The wire used is either galvanised iron-wire (i. e. iron-wire coated with zinc) or, for special purposes, hard drawn copper-wire. Underground wires are laid in cast-iron pipes provided with *flush boxes* at intervals which provide means of getting at the wires at intermediate points for testing, tracing faults, &c. These wires are of copper coated with gutta-percha. A 3-inch pipe will take as many as eighty wires.

(4) *Earths.*—In 1838 Steinheil discovered that, if a good electrical connection is made with the ground at each end of a single line, the earth will act as a substitute for a return wire. This was a very important discovery, for not only does it save the expense of a return wire, but it also reduces the resistance of the line by nearly half, with several attendant advantages. The technical expression 'earth' is applied to this connection, and an 'earth' may consist simply of a wire attached to a metal plate of a large surface buried in soil that is sure to be always damp; but metal pumps, or better still the iron water-pipe system in towns, will generally form excellent earths. Iron gas-pipes will do very well in default of water-pipes, but on no account must *leaden* gas-pipes be used, as there is a possibility of a discharge of lightning fusing the pipe and causing an explosion or a fire by igniting the gas. *Earth-currents.*—From causes as yet unexplained different parts of the earth are frequently at different potentials, so that, if two such points be connected by a wire joined to earth at each end, it is traversed by an *earth-current.* Such currents vary during different periods of every day, and at certain periods they acquire such strength as to be termed 'electric storms.' They then may often render ordinary working impossible, and on long cable circuits may even endanger the safety of the cable. In order to secure communication in such circumstances it suffices, where practicable, to use a return wire instead of earth. Lines whose terminations run north-east and south-west are most liable to interruption.

(5) *Circuit.*—This term, which is of very frequent use, implies the whole path along which a current of electricity may be supposed to flow; that is, for instance, the battery, lever of key, line-wire, coils of receiving apparatus, and the 'earth' at each end. *Short-circuit* implies that the circuit between two particular points (say the two ends of a coil of wire) is bridged across by a conductor of no resistance.

(6) *Batteries.*—The batteries most commonly used for telegraph purposes are bichromate, several forms of Daniell's, and two or three forms of Leclanché, but latterly secondary batteries have been introduced with great success. Ordinarily each set of apparatus at an office has a separate battery, but by a well recognised law of electricity the *universal battery* system is often applied where several circuits of much the same resistance terminate in one office. This means that several sets of instruments (usually not more than five) are joined up to a common battery, each of course working independently. The battery in this case necessarily wants more frequent renewal, but the first cost is less, and there is also a material saving in space, which is of very great importance in such cases—for instance, as at the Central Telegraph Office in London, where there are nearly 24,000 cells in use.

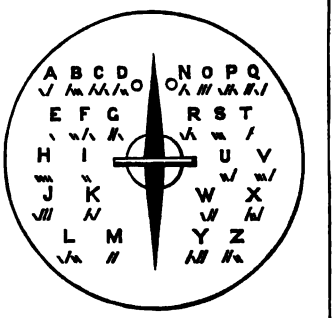

Fig. 1.

II. *Apparatus.*—(1) *The Needle System.*—In the earliest form of telegraph instrument, devised by Cooke and Wheatstone, five needles were used, each worked by two wires; this number was subsequently reduced to two, and now a single needle only is employed. Fig. 1 shows the dial of such an instrument. The

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needle normally hangs vertically, and is capable of motion to the right and left between two stops. The signals are formed by combinations of the two directions of deflection. The alphabet in general use, which is shown above on the face of the dial, is due to Professor Morse, and is hence called the 'Morse Code.' The letters most frequently used—*e* and *t*—are represented respectively by a deflection to the left and to the right. All the other letters of the alphabet are formed by two, three, or four combinations—the length of the signal for each letter being arranged with approximate reference to the frequency of its occurrence in ordinary English writing. In the same way the numerals, stops, and other signals are formed. The figures are represented by *five* signals, thus :

(1). — — — —	(6) — . . . .
(2). . — — —	(7) — —. . .
(3). . . — —	(8) — — —. .
(4). . . . —	(9) — — — —.
(5).	(0) — — — — —

and the stops, &c. by six combinations. The dots and dashes represent respectively deflections to the left and right. Figures, however, are always spelt in full on the single needle. The needle system is specially English, and is used almost universally for railway telegraphs throughout the three kingdoms. It has no equal for working a large number of offices on one circuit, and it has the great advantage of being extremely easy to learn and simple to work.

(2) *The Sounder System.*—For commercial telegraphy, however, the sounder system is distinctly the most generally serviceable of hand-worked systems. Opposite the poles of an electro-magnet is placed a soft-iron cross-piece or *armature*, fixed upon a lever which is so pivoted that a spiral spring attached to the end of one arm tends to hold the armature away from the poles of the magnet. The passing of a current through the coils causes the armature to be attracted, and its motion is limited by two adjustable screws which are so arranged that the two sounds emitted when the end of the lever strikes upon them are easily distinguishable. Sound-reading then consists really of noticing the intervals of silence between these two sounds. The Morse code as shown above is used, and (1) a *dot* is represented by a very short interval of silence between the downward stroke and the upward stroke of the armature lever; (2) a *dash* is represented by an interval three times as long; and in the same way the *space* between (3) the elements of a letter; (4) the letters of a word; and (5) the words of a sentence are represented by intervals between the downward and the upward strokes respectively equal to one, three, and five *dots*. The instrument by which these signals are spaced out at the sending station is called a *key*. A *single current key* consists simply of a lever so

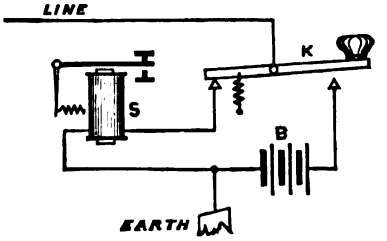

Fig. 2.

pivoted as to make electrical contact with one or two stops. This is shown diagrammatically at K in fig. 2, where B represents the battery and S the sounder. Normally a spring holds the lever of the key in the position shown, so that signals sent from the other stations pass from line to the lever of K, thence by way of the back stop through the sounder to earth. When, however, the handle of the lever is pressed a current passes from the battery, B, by way of the front stop and the lever of the key to the other stations. Thus the duration of the signals received at a distant station is determined by the periods during which K is depressed.

(3) *The Morse.*—It will be at once evident that a permanent record of the signals received may often be of considerable importance; hence, even before the introduction of the sounder, many devices for securing a permanent record were put forward. One of the earliest was the *Morse Embosser*, whose modern representative is known as the *Writer* or *Inker*. As shown in fig. 3, the

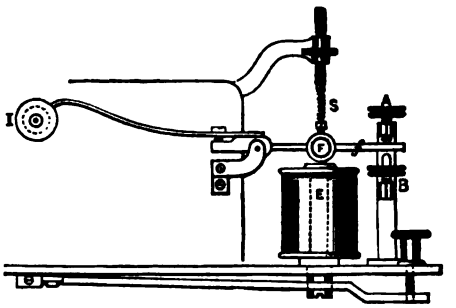

Fig. 3.

combination of the electro-magnet, E, with the armature, F, fitted upon the lever, *f*, which is adjustable by the stops, A, B, and the spring, S, is virtually a sounder, the lever of which is prolonged beyond the pivot and fitted with a small disc, I, kept constantly rotating in a well of ink; above this inking disc a strip of paper is moved forward by clockwork, so that whenever the armature is attracted by the electro-magnet the disc makes ink-marks upon the paper of a length proportioned to the period of attraction. Thus the *dots* and *dashes* of the Morse code can be recorded.

(4) *The Relay.*—For such instruments as the sounder and the ink-writer, however, where a comparatively considerable mechanical effect is required in order to secure satisfactory signals, a current must be used of such a strength as for a long line would absorb an inconveniently large amount of battery power. To obviate this a *relay* is introduced. A relay is practically a delicate form of the electro-magnet and lever of the sounder. The coils are wound with a finer and longer wire—finer only to get increased length of wire in the available space—and all its parts are proportioned with a view to the armature being actuated by very weak currents. The lever and limiting stops, which in this case are electrically insulated, are made to act as a key, and by this is introduced a *local battery* situated at the receiving station, and by means of which the sounder or other receiving instrument is actuated. The forms of relay are very numerous; but they may be divided into two groups—*non-polarised*, which are actuated alike by currents in either direction; and *polarised*, in which the armature, being either itself a magnet or permanently magnetised by a magnet placed in close proximity, is actuated according to the direction of the current. The form which is now most commonly used in England is the Post-office standard relay, the principle of which will be easily understood from fig. 4. Two coils, A and B, are fitted upon soft-iron cores having projecting

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pole-pieces, and are so fixed that two soft-iron armatures, *n*, *s*, fitted upon a common axle, may play between them. These two armatures are polarised by the magnet, N'S', brought near to their axle, and the two coils are joined up so that on the passing of a current their adjacent poles are of opposite polarity. Thus, if a current pass which makes the upper end of A of north polarity, the upper end of B will be of south polarity; A will therefore tend to repel *n*, and B will attract it; similarly (because the lower ends of A and B are then respectively south and north) *s* will be repelled from A and attracted towards B. All the forces therefore tend to move the armatures in the same direction, and so produce a very sensitive combination. The contact lever is fitted upon the axle with the armatures, and the contact stops are placed on either side.

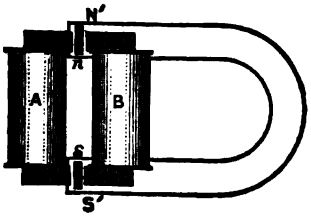

Fig. 4.

(5) *Double-current System.*—The value of the polarised relay arises from its use in connection with the *double-current* system; the principle of which is so to arrange the key and the battery that during the time of transmission there is always a current passing to line, this current being in one direction when the key is up, and reversed when the key is depressed. Thus, with a polarised relay the 'spacing' current holds over the relay tongue to the spacing side, so that the spring or other power otherwise required for this purpose may be almost dispensed with; and consequently the relay will be actuated by a much less powerful 'marking' current than would be required for single-current working. In fact, double current expedites working, reduces the current required (and so tends to increase the working distance of a telegraph line), facilitates the intercommunication of several stations on a single circuit, and is a very important feature in an extensive system.

(6) *Type-printing Instruments.*—Many ingenious devices have been made in order to secure a record of messages sent not merely in a 'code,' but in plain printed characters. Fig. 5 is a fac-simile of a

PRINTING INSTRUMENT

Fig. 5.

piece of slip printing by means of the Hughes Type-printer. The action is principally mechanical, the electrical part being confined to the transmission and reception of a single current of short duration for each letter or other sign registered. The sending apparatus is like a piano keyboard with the letters and other signals engraved upon the keys; but the mechanism is so complex and so sensitive that only the most skilled operators can be entrusted with its working. It is not used in England except for circuits which are in communication with the continental systems. Other printing systems are in use by various private news agencies. They generally require a current for every step forward of the type-wheel—say twenty-six currents to repeat a given letter (although it is really more)—but many ingenious arrangements are made for them, including a device by Mr. F. Higgins of the Exchange Telegraphy Company which prints in column form instead of merely on a continuous slip.

(7) *Duplex System.*—The rapid increase in the business of telegraphy has called forth the exercise of the ingenuity of telegraph engineers to increase the capacity of a single wire for the transmission of messages. Duplex telegraphy is one way by which this has been effected. By this system messages can be sent on one line in both directions at the same time, thus practically doubling the carrying capacity of the wire, because station A can transmit a message to station B while B is sending another message to A. Under ordinary circumstances, when A is working to B on the open circuit principle, any interference on the part of B disconnects his receiving instrument, and so prevents A's signals from being recorded, because the back stop is disconnected (fig. 2). If now it can be arranged that the receiving instruments at both stations can be always in circuit, yet only affected by the currents sent from their own station when these currents interfere with the currents sent from the other station, then duplex telegraphy becomes possible. There are several modes of doing this, but we shall confine ourselves to a description of the *differential* method, which is almost exclusively that adopted in the British postal telegraphs.

If two circuits of precisely equal resistance be open to a current, it will divide itself equally between the two, and the currents in each wire will be exactly equal. If, for instance, the wire, *ZlE* (fig. 6), offer the same resistance as the wire, *ZrE*, the current in *l* will have precisely the same strength as the current in *r*. Now let an electro-magnet be similarly wound with two wires of equal length, one of which is in the circuit of *l*, and the other in the circuit of *r*. If the current through *l* traverse the electro-magnet in the reverse direction to that through *r*, it is evident that if the currents be equal the polarity induced by the one current must be exactly neutralised by that induced by the other current, for the effects are equal and opposite, and there will be no magnetism excited. Thus, as long as the two circuits are intact, the currents which flow will not affect the electro-magnet; but if the currents in *r* be interrupted, those in *l* will excite the electro-magnet, and if those in *l* be interrupted, the currents in *r* will excite the electro-magnet.

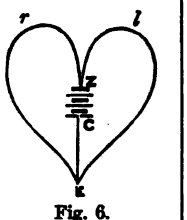

Fig. 6.

Assume A and B (fig. 7) to be two stations connected together by the line-wire, *l*. Let E be an electro-magnet at A, wound as just described, K a key, and B a battery. Let *r* represent resistance coils

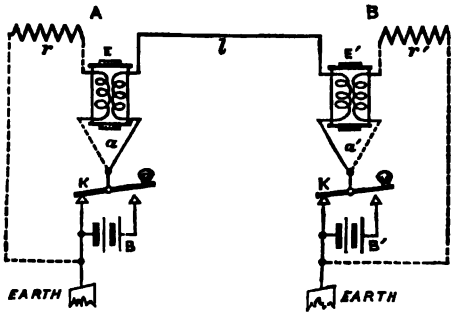

Fig. 7.

or an artificial line, giving a resistance equal to the line circuit. Have a precisely similar arrangement at B, as shown. Now let us in the first place assume A alone to be working to B; every time the key, K,

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at A is depressed a current is sent from A's battery. This current divides at *a*, the one half going through the wire in connection with *l* in E, through *l*, and at B, through the wire in connection with *l* in E′, through the key, K′, to earth and thence back to the battery at A. This is called the *line current*. The other half, which is called the *compensation current*, passes around the electro-magnet, E, through the coil in connection with *r*, through *r* and back to the battery. As these two currents are equal, their effect on E is *nil*, but the line current passing through one coil only of E′ operates it and causes signals to be given. Thus while A telegraphs to B its own instrument is not affected, but that at B is actuated. Similarly, when B alone is working to A its own instrument is not affected, but that at A is actuated. But when B is working to A at the same time that A is working to B, what happens? Every line current that leaves A at the same time that a line current leaves B is neutralised. The compensation current at A is now able to excite the electro-magnet, and the armature is moved in precisely the same way as if B's current were received. In the same way B's line currents are neutralised, and its compensation currents move the armature of E′ in precisely the same way as if A's currents were received. Thus E and E′ continue to be worked by their respective stations, regardless of the fact that the line currents are being continually neutralised, so that practically no current flows between A and B, and that they are operated sometimes by the line current and sometimes by the compensation current. Thus, while A sends messages to B, B can be sending messages to A upon the same wire and at the same time.

We assumed that the line current received at A from B was exactly equal to that proceeding from A to B, and that therefore they were exactly neutralised, but it is not so in practice, for owing to the effects of bad insulation the incoming line current is always weaker than the outgoing one. Hence the current received at A from B does not neutralise the whole of the current sent from A to B, but only a portion of it. It so weakens A's current to line that the compensation current preponderates over this resultant current, and the signals are registered by the preponderance. The difference in the strength of these two currents when both stations are working is very nearly equal to the strength of the current received at A when B alone works, so that the marks, whether made by the received line current or by the preponderating compensation current, are practically the same.

We have shown in the diagram that the same poles of the battery are to line, and that therefore the line currents flow in opposite directions; but the same effects occur if the opposite poles are to line, and the currents flow in the same direction. If the current from B flows in the same direction as that from A, the effect, when the two stations work simultaneously, is not to weaken the resultant current, but to strengthen it, and therefore to produce a preponderance of the current in wire *l* over that in wire *r* of relay E, and consequently to register signals; but in this case the marks made at A when both stations are working simultaneously are not made by the preponderance of the compensation current over the line current, but by the excess of the resultant line current over the compensation current.

There are certain irregularities in the working of such a system in actual practice which have to be provided against, due to variations in the resistance and in the electrostatic capacity of the line. Telegraph wires, in fact, are in a constant state of change. If A and B be connected together by an aerial wire supported at intervals of about 80 yards upon earthenware insulators, then the current which arrives at B from A must necessarily be less than that which leaves A, because at each pole a small portion of the current escapes or leaks to earth. No earthenware support is an absolute insulator. Moisture is deposited upon its surface. The amount of this moisture continually varies, and the resistance of the insulator to the leakage of the current varies with it. Hence the difference between the current leaving A and that arriving at B is constantly varying, and the effect upon the current leaving A is precisely the same as if the resistance of the line varied. If moisture be abundant more current leaves A, and the effect at the sending end is the same as if the resistance of the line-wire were reduced, but of course the increased current is not received at the other end. If the insulators become dry, less current leaves A, and the effect is the same as if the resistance of the line were increased. In fact, the resistance of the circuit does vary with the amount of moisture deposited on the insulators, and with the amount of dirt which necessarily adheres to them. Rain, fog, dew, and mist affect it. Lines exposed to the spray of the sea or the smoke of manufactories are peculiarly liable to this variation. Other causes also introduce irregularities which interfere with the constancy of a line. The wires are continually subject to accidents of various kinds, many of which tend to produce variable resistance.

Now what effect has this variation of the resistance of the line-wire upon duplex working, and how is it provided for? Clearly it disturbs the equality of the line and compensating currents, and causes the one to preponderate over the other; and if no means were adopted to compensate for this variation, duplex telegraphy would be impossible. Therefore the resistance in the compensation circuit is not made a fixed quantity, but consists of a series of resistance coils, by which the resistance of the compensation circuit can be varied in consonance with the variation of the line circuit. This instrument is called a *Rheostat*.

The compensation current is then adjusted by the aid of a *differential galvanometer*—i.e. a galvanometer double wound in the same way as the relay coils, the line current passing through one coil and the compensation current through the other in the opposite direction. Thus, when the compensation circuit is properly adjusted, the outgoing current will produce no effect upon the galvanometer.

Another modifying influence present on a telegraph line is *electrostatic capacity*—i.e., in brief, the power which it has of retaining or accumulating a portion of any current passing in it. This also has to be properly represented in the compensation circuit, and this is done by means of *condensers*. This is a term applied in electricity to an apparatus generally composed of alternate layers of tinfoil and paraffined paper (or mica), so arranged and connected as to form virtually a flat Leyden jar of large surface. As the capacity of a telegraph line varies with weather and from other causes, the condenser is also made variable.

It will be seen that satisfactory duplex working demands more skill and attention from the operators than does ordinary working; hence, as there are always times during which the requirements of business do not render it necessary that a circuit shall be worked duplex, and as it occasionally happens that owing to line variations, &c. duplex working becomes temporarily impracticable, all duplex circuits are fitted with switches, by means of which recourse may be had to ordinary working, still using the same apparatus.

(8) *Quadruplex System.*—Duplex telegraphy, as

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explained in the last section, means the transmission on the same wire of a message from (say) station A to station B while B is sending another message to A. If A or B be able to send *two* messages to the other at the same time on the same wire we have *diplex* telegraphy; and by combining these two systems—duplex and diplex—we may have four messages being sent simultaneously on a single wire, and this constitutes *quadruplex* telegraphy.

Suggested by Stark and Bosscha in 1855, it was not until 1874 that the problem of quadruplex working was solved by a device of Thomas Alva Edison, and the system now in use is the result of his efforts, supplemented by the work of Prescott, Gerritt Smith, and others. It may be broadly described as the duplex system provided with two keys in the sending circuit, and two relays, each having a coil in both the line and the compensation circuits (*l* and *r*, fig. 7). One key (on the A side of the set) is so connected that when its lever is depressed the battery connections are reversed, so reversing the direction of the current; while the other key (on the B side) is so constructed that the depression of the lever brings into circuit three times as much battery power, so that (whatever the direction of the current) it is increased in strength threefold. The A side relay at the other end responds correctly to the 'marking' and 'spacing' currents whatever their strength, while the relay on the B side is actuated only when the greater current is received, and then responds whether the current is 'positive' or 'negative.'

Since the introduction of the system into the Post-office telegraphs it has been considerably improved and simplified, so that now a battery having an electromotive force of 130 volts will satisfactorily work circuits that at one time required 200 volts, and even then worked indifferently. Among many varieties of useful arrangements of this system may be mentioned the 'forked' system, where, for instance, the London end of a circuit is fitted with full quadruplex apparatus, and the Leeds end is fitted with a special set, by means of which the A side of the London circuit is put in direct communication with Stockton, while the B side is connected to West Hartlepool. Both Stockton and West Hartlepool thus have direct *duplex* communication with London on a circuit common to both from Leeds. There are at present between thirty and forty wires worked on the quadruplex system in Great Britain.

(9) *Multiplex Telegraphy.*—In 1873 Meyer conceived the idea of so arranging two corresponding sets of apparatus at distant places that, by causing them to move in exact synchronism, the use of a telegraph line might be given successively to several operators for a very short period of time, so that one at each end would have it alone during the recurring periods. The synchronous movement of the two sets would ensure that each operator at one end should always have communication with the corresponding operator at the other.

Now that the idea has developed into a practical

Fig. 8.

system, it is known as the *multiplex* system. Fig. 8 indicates the principle. If the arms, *a*, *b*, which are electrically connected with the line-wire at A and B respectively, be made to rotate simultaneously around the circles 1, 2, 3, 4, making contact with the segments as they pass, then when *a* is on A 1 *b* will be on B 1, when *a* is on A 2 *b* will be on B 2, and so on. Again, if 1, 2, 3, 4 at each station be connected to a set of telegraphic apparatus (say a single-current sounder set), then each of the four sets at A will be successively connected with the corresponding set at B as the arms, *a*, *b*, move over the segments 1, 2, 3, 4. Thus for each revolution of the arms the instruments connected to A 1 and B 1 will be in direct communication once, and so also with A 2, B 2; A 3, B 3; and A 4, B 4.

Now suppose that each of the segments in fig. 8 be again divided into four and connected to each of the four sets of instruments instead of with only one of them (fig. 9). During one complete revolution of the arms each pair of instruments

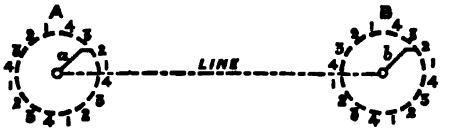

Fig. 9.

will be in communication four times; and it is clear that if the arms in the two cases assumed be moving at the same rate, then, although the time during which each instrument is connected to line during one revolution of the arms will be the same, in the latter case it will be divided into four smaller periods, each separated by a period of disconnection of only one-quarter the length which occurs in the former case. This subdivision may of course be extended to a very considerable extent, and in practice it is so far extended that the intervals of disconnection are so short that with the apparatus used they may be neglected, so that each set of apparatus may be worked as if it and its corresponding set alone were connected to the line.

Meyer's system proving impracticable was improved upon by Baudot in 1881, but still without success, the difficulty being in maintaining synchronism. Paul La Cour of Copenhagen had in the meantime taken up the question of synchronism, and he invented a very ingenious plan which contained the germ of success. In 1882 Patrick B. Delany of New York perfected a plan for synchronism on La Cour's principle, and in 1884 produced a complete and workable multiplex system.

It will be seen that the principle of multiplex working differs so materially from the principle of duplex or quadruplex that all they really have in common is the capability of the simultaneous transmission of more than one message upon a wire. Hence the application of the same terms duplex, quadruplex, and sextuplex (working three messages each way on the quadruplex or similar principle) to the corresponding arrangements in multiplex working would tend to confusion, and therefore a special nomenclature, based upon the Greek word *hodos*, 'a way,' is adopted. Thus two-way working, that is, a mode of working by which two messages may be sent over the same line on this system, is known as *diode*; three-way, *triode*; four-way, *tetrode*; five-way, *penthode*; and six-way, *hexode*.

The great difficulty to be overcome in order to make the system practical was to secure the synchronous movement of the two arms rotating over the segments. The nearest approach to isochronism can be obtained with two tuning-forks pitched to absolutely the same note and set into vibration under exactly the same conditions, but

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the least interference (even a variation of temperature) is sufficient to affect the time vibration.

The instrument with the rotating arms and the segments is called the *distributor*, and its rotating arm is driven by means of a vibrating reed (virtually a tuning-fork) which intermittently completes the circuit of a battery through an electro-magnet in front of the poles of which an iron toothed wheel is fitted, this wheel being fixed upon the same axle as the arm. The reed, R (fig. 10), is simply a flat bar of mild steel firmly clamped at one end.

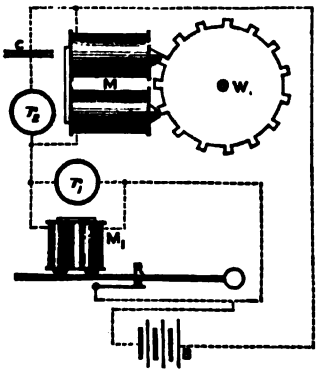

Fig. 10.

On one side of the free end is placed an electro-magnet, M_1, the circuit of which includes the reed and a light contact spring. If the battery, B, be joined up as shown in fig. 10, the reed will be attracted towards the electro-magnet, and the circuit will thus be broken between the spring and the reed, attraction will therefore cease, and the reed will resume its original position. The circuit will then be again complete, and the same movement will be repeated, so that by this means the reed is maintained in vibration. The circuit of the battery, B, however, includes the coil of the electro-magnet, M, before the poles of which is pivoted the iron toothed wheel, W. When the circuit is complete and the cores of M are magnetised, the teeth of W are attracted to the position shown, but, as the attraction immediately ceases, the momentum that W has acquired is sufficient to carry it on, so bringing the next adjacent teeth within the range of attraction, when the circuit is again complete. Thus the reed is made to cause W to rotate. On tracing the course of the current from battery B it will be noticed that after passing through the electro-magnet, M, it has a course through r, without passing through M_1. This coil constitutes what is known as a *shunt* upon M_1, and the current divides between the two in the inverse proportion of their resistance. The current cannot pass at C and r_2, as C—a small condenser—is virtually a point of disconnection. The function of C and r_2 is to prevent sparking at the reed contacts from the discharge of the electro-magnet, M.

The motion of the wheel, W, is regulated by a fly-wheel placed over it; but, as a dead-weight would not accommodate itself to a sudden momentary variation of speed to which the motor may be subject, the fly-wheel consists of a wooden block in which are two deep concentric grooves which are filled with mercury. It is thus really the rings of mercury which form the fly-wheel, and they are not readily influenced by irregularity of running: even if the wheel be actually stopped the mercury continues to move, and will carry on the wheel if the period of stoppage be not too considerable.

In practice it at once becomes evident that the reed at one end of a line cannot possibly be expected to keep absolutely isochronous with that at the other, the result being that the signals sent from the set of segments 1 are received successively upon the receiving segments 1, 2, 3, &c. at the other end. In order to prevent this and keep 1 always to 1, 2 to 2, &c., sets of 'correcting segments' are provided. These are divided into 'sending' and 'receiving corrections,' and are so arranged that when the trailer on the arm, a, is upon a sending correction segment the trailer on b will be on a receiving correction segment, and *vice versâ*; and if it should be lagging slightly behind its proper position the current will pass to a correcting relay, which will slightly quicken the slower reed. As these corrections can be applied if necessary nine times in each second, practical synchronism is secured.

The number of 'ways' which it is possible to work with this system is principally determined by the static capacity of the line, but a clear description of the theory of this is not possible here.

In actual working with the distributor used in England there are (practically) 162 segments, and 144 of these are grouped at intervals of twelve; so that they form twelve sets, apart from the correcting segments. The time of a complete revolution of the trailer at normal speed is one-third of a second, so that the time of contact with each segment is about $\frac{1}{100}$th of a second, and each group is therefore connected to line for $\frac{1}{300}$th of a second about thirty-six times per second. Special large relays, wound to a high resistance (1200 ohms) and connected with condensers of a large capacity, are used for receiving. By this arrangement the short impulses are converted into continuous signals, and thus the distributor (by connecting the line consecutively to certain pairs of sets of apparatus, one at each end, at very short intervals) enables each pair to work as well as if it alone had sole use of the line.

The maintenance of good working requires considerable skill and experience, as well as a thorough grasp of the whole principle, and it is necessary to make one station solely responsible for the adjustment of speed, &c.; otherwise the attempts of one station to secure good working may altogether upset similar efforts at the other end.

(10) *Automatic Telegraphy.*—The several kinds of apparatus already described are dependent entirely upon the hand for the transmission of the signals, and this necessarily limits the possible speed of transmission. Even the sounder—the fastest hand-worked instrument now used—cannot be worked by the most expert of operators at a rate exceeding forty-five words a minute. This is, however, by no means the limit of speed at which signals can be recorded even by the simple Morse inker; so that, although dependence upon the muscular motion of the wrist and the directive action of the mind may keep the speed at a comparatively low value, if the manipulation of the human agent can but be replaced by the precision and regularity of a suitably arranged machine, not only can we attain, but far exceed, the highest speed of the ordinary Morse or sounder. Hence early efforts were made to replace the hand-worked key by some mechanical contrivance which would not only remove the defects inherent to manual labour, but would secure precision in the formation of the characters, accuracy in the despatch of messages, and speed in transmission. Bain in the year 1846 was the first to propose this. He punched broad dots and dashes in paper ribbon, which was drawn with uniform velocity over a metal roller and beneath styles or brushes of wire, which thus replaced the key, for whenever a hole occurred a current was sent by the brushes coming in contact with the roller. The recording instrument was his chemical marker. The speed at which messages were transmitted at experimental trials was enormous; 400 messages per hour were easily sent; but when to the defects in the machinery were added the disturbances on the line from causes which were then unknown, it failed to commend itself. Perhaps the real reason for its not being persevered with was that at that time it was really

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not wanted; but now that telegraphic business has increased so enormously that extra wires are needed in every direction, apparatus which increases the capacity of the wires, by sending through them a greater number of messages in a given time, has become a necessity.

Wheatstone's system of automatic telegraphy is that which is used in England. Bain's method of punching has been considerably modified, and the messages are recorded on an exceedingly delicate form of direct ink-writer. The apparatus consists of three parts: the *Perforator*, by which the message is prepared by punching holes in a paper ribbon; the *Transmitter*, which sends the message under the control of the punched paper; and the *Receiver*, which records the message at the distant station when thus sent by the Transmitter.

The *Perforator* consists of three levers or keys the depression of which actuates five punches in a certain order, and also a groove and a feed arrangement to guide and move forward the paper as it is punched. The paper used is of a white description dipped in olive-oil. The three keys on being depressed drive the punches through the paper, cutting out clean round holes. The depression of the left-hand key causes the paper to be perforated

O

with three holes in a vertical line thus: o; the

O

depression of the centre key punches one—centre—hole only, thus: o; and the depression of the right-

O

hand key perforates four holes arranged thus: oo.

O

The left-hand key corresponds with dots, the centre with spaces, and the right-hand with dashes. It will be noticed that the holes made in the centre of the slip are smaller than those in the upper and lower rows. They admit the teeth of a little star wheel, which is turned through a small space whenever one of the keys is depressed, and which thus moves the paper forward a certain distance for each depression of either key by a species of rack and pinion movement. The space through which the paper is moved for a dash is twice the length of that through which it is moved by either of the other keys. In fact two central holes are punched for each dash required, and the star wheel is made to turn two teeth instead of one as in the case of the other two keys. If left, right, and centre be struck or depressed in succession, we have the paper prepared for the letter A; if right, left, left, left, and centre be depressed in succession, we have the paper prepared for the letter B: and so on for all the letters and signals. The word *Paris* thus prepared is indicated by fig. 11. An expert

Fig. 11.

operator can punch at the rate of about forty-five words per minute, but the average rarely exceeds forty.

The *Transmitter* replaces the key of the ordinary apparatus, and it sends the currents by mechanical means under the control of the punched paper: hence the name of the system—the Automatic.

The arrangements of the parts is such that when running free the electrical portion sends alternate reverse currents of short duration, but when the slip is inserted these reversals are interrupted by means of the action of vibrating pins which tend to pass through the upper and lower holes of the slip. Thus, to take the first letter of the slip shown above: the transmitter would be sending a spacing current when the back pin would rise through the first upper hole and permit a reverse (marking) current to be sent. On the next rising of the front pin it would pass through the first lower hole, and the reverse (spacing) current would pass. Thus a 'dot' would have been sent to line. The spacing current would remain on (for a period equal to the length of a dot) until the back pin again rose through the second upper hole, when the marking current would again be to line. When the front pin again rose its progress would be stopped by the slip, as there is no hole in the lower row beneath the second upper hole, and therefore no reversal would take place; the same applies also to the next rising of the back pin, and the marking current would therefore remain on until the occurrence of the second lower hole permitted a reversal; thus the second signal would be three times as long as the first—the proper respective lengths of a dot and a dash—and so on with the other signals and spaces.

The *Receiver*, by means of which the signals sent by the transmitter are recorded, is a direct ink-writer of a very sensitive character. The slip is drawn forward between two rollers by means of a train of wheels driven by a large weight. Before passing between the rollers the slip is brought near to a small inking disc which is rotated when the clockwork is in motion. The instrument is regulated by a fly to maintain uniform speed, and this fly is so arranged that by means of a lever the speed of slip can be adjusted to suit recording at any speed between 20 and 450 words per minute. The light marking disc is fixed to an axle geared with the clockwork, and rotates close to the periphery of a larger disc that moves, in the reverse direction, in a well of ink. This latter disc takes up the ink and feeds the marking disc by capillary attraction without introducing friction.

Passing now to the electrical arrangement of the receiver, the electro-magnets which work the recording armature consist of two bobbins of fine silk-covered copper-wire, having cores of carefully annealed soft iron. If these cores were provided with a cross-piece they would form what is generally known as a horseshoe-shaped electro-magnet; but less electro-magnetic inertia and greater rapidity of action are obtained by dispensing with the cross-piece and providing a second armature at the lower end of the axle, polarised in the opposite direction to the upper armature by means of the other pole of the inducing magnet. The arrangement is, in fact, similar to that shown by fig. 4. The *working* speed at present attained by this system is about 400 words per minute, although it has been possible to greatly exceed this speed in experimental running, and the *workshop test* is a speed of 450 words. An English telegraphic 'word' is taken to be twenty-four possible reversals on the transmitter.

(11) *News Circuits.*—Automatic instruments are employed on nearly all long circuits in England, not only because they increase the capacity of the wires for the conveyance of messages, but because they are so specially adapted for the conveyance of news, which is such a distinctive feature of the English system of telegraphy. One batch of news is often sent to a great many different places, and as four or even eight slips can be prepared at one operation, and one slip can be used several times, the labour of preparing for transmission is very much reduced. In fact, without this system it would be simply impossible to transmit the enormous amount of intelligence sent telegraphically all over the country. There are many news circuits radiating from the Central Telegraph Station,

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having three and four intermediate stations upon them, one or more of which 'repeat' or 'translate' onward to three or four more stations. Thus one punched slip disseminates the news to many places.

As already stated, the transmission of 'news' for the metropolitan and provincial press constitutes a special and distinctive feature of the English system. The work involved is enormous. During the year ending the 31st March 1891 5,003,409 press telegrams, containing no less than 600,409,000 words, were transmitted through the Postal Telegraph Department—an average of nearly two million words per diem. The press tariff, however, is arranged on so low a scale that the average price paid is only a little over 2d. per hundred words. During ten years the increase in news transmitted was about 83 per cent.; the numbers for the year ending 31st March 1881 having been 2,735,042 messages and 327,707,407 words. Messages can be sent at the press rate only after 6 P.M. To save delay and secure the transmission of their news at a fixed cost and without the inconvenience of keeping and checking telegraph accounts, several journals arrange for the sole use of a wire during certain hours of the evening. Thus, six Scottish journals appropriate nine London wires after 6 P.M.; four wires are allotted to as many Irish papers, while dailies published in English provincial towns absorb sixteen more. Some of the London dailies have a wire to Paris every evening, and one (the *Daily News*) also has one to Berlin.

Turning now to the news transmitted by the departmental operators, a large proportion is of general interest handed in by various news agencies. Such news items have to be sent to addresses in all parts of the country, and to effect this the slip once prepared can be used over and over again upon different circuits; moreover, by means of pneumatic power, the perforators at the Central Telegraph Office are capable of punching as many as four slips at a time, and, the pneumatic instruments being arranged to work two perforators, *eight* slips are thus prepared at one operation. Not only can one slip be used upon several different circuits, but often several offices which generally take the same class of news can be placed upon one circuit, so that all take the same messages simultaneously. On the other hand, in some cases when an address is outside the delivery of a news circuit the message has to be received, written up, and again transmitted. Indeed, in some cases this has to be done twice for some small towns which publish weekly or bi-weekly papers, and the second transmission may even have to be done by hand.

(12) *Repeaters.*—The length and description of a circuit has a great deal to do with the possible speed at which it can be worked. The greater the distance, as a rule, the lower the speed, and the reducing effect of a mile of underground wire is greater than 20 miles of aerial line. But even with an aerial line the leakage, &c. at the insulators makes the strength of current received, as compared with that sent out, proportionally less as the distance increases; and although it is of course possible to compensate for this loss by an increase of battery power, it is not so easy to compensate for the retardation due to electrostatic capacity. In dry climates the limit of distance for uninterrupted communication is rarely reached in practice, but in England the conditions are such that 400 miles may be taken as the limit. It then becomes necessary to take off the messages and repeat them by clerks, or to introduce a *repeater* or *translator* which, worked by the original currents, will automatically transmit or relay stronger currents similar in direction to, and of equal duration with, those which are passed through it. It is, in fact, an extension of the principle of the ordinary relay, and is introduced into the circuit for a similar reason—the relay is placed in circuit that it may be actuated by currents which would not work the sounder or Morse writer direct, and completes a local circuit in which the receiving apparatus is placed; the repeater is also arranged to relay similar currents to those which actuate it; but while the relay as ordinarily used is required to work an instrument in the same office, the prime function of the repeater is to retransmit the signals along an extension of the original line. By this means it is possible to work to any distance. Thus the Indo-European line from London to Teheran, a distance of 3800 miles, is worked directly (without any retransmission by hand) by means of five repeaters.

Varley introduced repeaters at Amsterdam to translate the English double-current system of working into the Continental single-current system in 1858, but in England the Post-office has introduced them to increase the rate of working. There is, however, a limit to the number of repeaters which can be employed on one line. The motion, friction, and inertia, both magnetic and mechanical, of the moving parts, and the introduction of disturbing electrical causes, prevent the duration of the contact of the tongue of the relay from being the exact counterpart of that of the sending key. It is of less duration. Retardation therefore takes place, and the rate of working is reduced with each relay added. In few cases in England is more than one repeater introduced, but by means of that an actual and decided increase of speed is obtained, due to the fact that the speed of working of the whole circuit is made that of its worst section alone. Their value may perhaps be best demonstrated by stating that by means of the *Fast Duplex Repeater* it is possible to mechanically retransmit messages, at the rate of 450 words per minute, simultaneously in both directions, on circuits exceeding 400 miles in length; and by referring to the fact that the highest speed attainable without repeater upon the London-Amsterdam wire is 116 as compared with a speed of 400 words with a repeater at Lowestoft, while the London-Dublin circuit without repeater will give only 120 words, and with a repeater at Nevin a possible 450. The latter figure, too, represents the highest possible speed not of the line but of the present form of instrument. It is impossible, however, in this article to give a correct idea of the working details of the repeaters now used.

(13) *Submarine Telegraphy.*—Owing to the retarding influence of a long submarine cable, by which it becomes difficult to pass ordinary electric currents through the cable except at very long intervals, giving the cable meanwhile time to discharge, and owing also to other disturbing causes, special means have to be adopted in working such cables in order to obtain the maximum possible speed. The method usually adopted was invented by C. F. Varley, and consists in interposing a condenser in the receiving circuit, so that instead of the circuit being complete it is interrupted at the condenser; and the instrument—a very sensitive form of galvanometer devised by Lord Kelvin (Sir William Thomson)—is actuated merely by the charge and discharge of the condenser. The Thomson galvanometer, without which long cables could scarcely have been commercially successful, consists essentially of a magnet composed of one or more pieces of watch-spring, $\frac{3}{8}$-inch in length, cemented upon a small circular convex mirror of silvered glass, which is suspended by a short thread of cocoon silk without torsion. This needle is suspended in the centre of a coil of very fine wire, and a ray of light is projected from a lamp upon

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the mirror. The beam of light is reflected at some distance upon a scale, and a very minute movement of the mirror therefore produces a considerable movement of the ray projected upon the scale. The movements of the spot of light upon the scale are read off in precisely the same way as the motions of the pointer on the dial of a single-needle instrument. The ordinary Morse system on an Atlantic cable could scarcely have a speed of one word a minute, while fifteen words is a usual speed with the reflecting galvanometer, and twenty-four have been obtained. Lord Kelvin also invented in 1867 the *Syphon Recorder*, by which cable messages can be permanently recorded as on the Morse system; this is now extensively superseding the mirror instrument. For short cables, special applications of the ordinary systems are adopted.

Submarine cables are generally made each on its own merits or according to the experience of the consulting electrician, hence it is impossible here to give much idea of the construction. The deep-sea portion of an Atlantic cable laid in 1865, shown in fig. 12, was formed thus: Seven copper wires were laid up together, six being laid spirally around the seventh, and so thoroughly surrounded with Chatterton's compound (a mixture of resin, Stockholm tar, and gutta-percha) that every interstice was filled. Over this were laid alternately four coatings of compound and of pure gutta-percha. This was then carefully wrapped with jute and the whole was sheathed with ten iron wires, each of which was first completely wrapped with strands of tarred Manilla yarn. The total diameter was 1·127″; the weight per knot in air, 36 cwt.; and its breaking strain, 8 tons. 'Shore end' cable is always further protected with an additional plain wire sheathing over an extra thickness of hemp. In the cable just described there was a length of 50 miles of shore end.

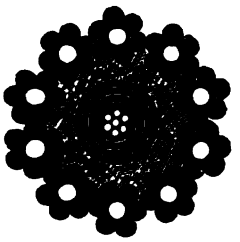

Fig. 12.

III. *Statistics.* — The first public telegraph company in England—the Electric and International—was founded in 1846. This was followed by the British and Irish Magnetic, the United Kingdom, and many others, besides which the various railway companies transmitted messages upon their own systems, and acted as agents to the various companies. This arrangement continued, greatly to the public inconvenience, until the 1st February 1870, when, by the powers of an Act passed during the previous year, the property of the companies was transferred to the state at a cost of £10,880,571, and a monopoly of telegraph business was vested in the Post-office Department. The phenomenal progress between 1870 and 1890 is shown by the following table:

Telegraph offices	1,007	5,678
Railway receiving offices	1,900	1,679
Miles of line (poles)	14,952	32,006
Miles of wire	60,108	195,261
Messages	9,850,177	66,409,211
Average cost	2s. 1·8d.	7·95d.

In 1890 the number of sets of apparatus reached 22,273, of which 476 were automatic, 117 repeaters, 51 quadruplex, and 28 multiplex. The first telegraph company in the United States—with lines from Washington to New York—dates from 1845. In 1890 the telegraphs of the United States were almost all in the hands of the Western Union Company, which had 183,917 miles (out of a total of over 210,000) of line, 678,997 miles of wire, 19,382 offices, and sent 55,887,762 messages. International statistics are collected and regularly published by the International Bureau at Bern. International rates, regulations, &c. have all been settled at various telegraph conventions. Hitherto submarine telegraphs have been almost entirely in the hands of the English-speaking race. Of 886 short cables owned by government administrations Great Britain holds 115. The total lengths of cable and of conductor are respectively 14,480 and 21,560 knots; the English cables being 1599 knots long, with conductors measuring 5508 knots. Of the cables owned by private companies all but 20 (with a total length of 7306 knots) are held by English-speaking people: the total number of such cables now amounts to 289, with a total length of conductor of 139,594 knots.

The operations of the Eastern Telegraph Company, serving southern Europe, Egypt, Bombay, &c., embrace the use of 76 cables having a total length of 25,375 knots under its own control, besides its connection with the 9 cables of the Eastern and South African Company (6644 knots), and the 25 cables of the Eastern Extension Australasia and China Company (15,129 knots).

There are at the present time 14 cables crossing the Atlantic which are owned by six different companies. In 1869 the Anglo-American Telegraph Company laid 2717 knots between Brest and St. Pierre, this being the longest continuous length existing; since then the same company have laid three other transatlantic cables, and their system, including short cables on the American and European coasts, amounts to a total length of 10,400 knots. The Direct United States Company have a cable which was laid in 1874–75. The Paris and New York Company in 1879 laid 2281 knots between Brest and St. Pierre. The Western Union Company (whose overland intercommunication in North America includes 183,882 miles of line and 678,868 miles of wire) have two cables, laid in 1881–82; and the Commercial Cable Company laid two cables in 1884, the opening of which led to a reduction in rates to New York and other places from 2s. to 1s. per word. Besides these the Brazilian Submarine Cable Company have two cables from St. Vincent to Pernambuco (Brazil), laid in 1874 and 1884.

The transatlantic tariff of the Western Union Telegraph Company, which may be taken as representative of the other companies, is 1s. per word for messages to be delivered in New York City, Brooklyn, and Yonkers, and 1s. 2d. per word for other places in the state of New York. The 1s. rate applies also to Ontario, Quebec, Cape Breton, Connecticut, Maine, Massachusetts, New Brunswick, Newfoundland, Nova Scotia, and a few other places. The highest rate to the States or to Canada is 1s. 9d., which applies to British Columbia, North-west Territory, and Vancouver Island. The charge to Central America is about 5s. 3d. per word, and to Brazil it varies between 6s. 2d. (in the northern region) to £1, 8s. 10d.

See, besides the articles ELECTRICITY and ATLANTIC TELEGRAPH; Culley, *Practical Telegraphy* (8th ed. 1888); Preece and Sivewright, *Telegraphy* (9th ed. 1891); Annual Reports of Postmaster-general; statistics published by International Bureau in *Journal Telegraphique;* also the abridgments of Patent Specification (vol. *Electricity and Magnetism*) published by the English Patent Office.

Telegraph Plant (*Desmodium gyrans*), an Indian leguminous plant. Of its trifoliate leaves the lateral leaflets, which are small, have, especially in a warm, moist atmosphere, a strange spontaneous motion; they jerk up and down (sometimes 180 times in a minute), as if signalling,

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and also rotate on their axes (see PLANTS, Vol. VIII. pp. 221, 222).

Tel-el-Amarna, or TELL-EL-AMÂRINA, the modern name of a mass of ruins representing the capital of the heretic Egyptian king, Amenhotep IV. (see EGYPT, Vol. IV. p. 240), a little to the north of Assiout, on the eastern bank of the Nile. Here was found in 1887 a collection of tablets in Babylonian cuneiform, at that period—some time before the exodus of the Israelites out of Egypt—used as a kind of *lingua franca* for all western Asia. These tablets were mainly reports from the Egyptian governors of Palestine, Syria, Mesopotamia, and Babylonia, some of which implored help against the Hittites (q.v.), then pressing southwards. Of about 230 tablets 160 went to the Berlin Museum and 82 to the British Museum.

Tel-el-kebir, midway on the railway between Ismailia and Cairo, was the scene on the morning of 13th September 1882 of the capture by Sir Garnet Wolseley of Arabi Pasha's entrenched camp, defended by 26,000 men. The British loss was about 430 killed and wounded, the Egyptians' 1500.

Tele'machus, son of Ulysses (q.v.) and Penelope, was an infant when his father left home to join in the war against Troy, but during his twenty years' absence grew into manhood. Under the guidance of Athene, who had assumed the appearance of Mentor (q.v.), Telemachus set out in search of his long-lost sire, after having vainly endeavoured to eject his mother's troublesome suitors from the house. Having visited Pylos and Sparta, Telemachus returned home to Ithaca, where he found his father in the guise of a beggar, and with him proceeded to slay the suitors.—In modern times Telemachus is known chiefly as the hero of Fénelon's romance, once very popular as a school-book.

Teleology (Gr. *telos*, 'an end'), the doctrine of final causes (see CAUSALITY), is usually limited to the argument for a creator and for the existence of God derived from the existence, beauty, and perfection of the world; the *a posteriori* argument of Apologetics (q.v.). See also THEISM.

Teleosaurus, a genus of fossil crocodiles, the remains of which occur in the Lower Jurassic rocks. They are found associated with marine fossils, and the peculiar modification of their skeleton seems to have specially fitted them for an aquatic life. Both surfaces of the vertebræ were slightly concave, the hind-legs were large and strong, and the anterior portion of the body gradually tapered into the long and slender jaws, giving the animal the aspect of the gavial of the Ganges; but the jaws were more attenuated, and the nasal aperture, instead of being oblique, opened vertically on the truncated end of the upper mandible. The jaws were armed with numerous equal and slender teeth, slightly recurved.

Teleostei. See BONY FISHES.

Telepathy, a word coined about 1886 from the Greek to express the supposed power of communication between one mind and another by means unknown to the ordinary sense-organs. Some members of the Psychical Research Society believe that they have established the fact that such a power does exist in the material universe, and have attempted to turn the assumption to account in the explanation of certain unexplained natural phenomena. See the Society's *Proceedings*, and Gurney and Myers, *Phantasms of the Living* (1886).

Telephone. This instrument is designed to reproduce sounds at a distance by means of electricity. Sound is due to vibrations of the air, and these vibrations differ among themselves in, and are characterised by, three particulars—viz. frequency or number per second, amplitude or range of displacement, and co-existence of simultaneous vibrations affecting the same air. These physical data determine respectively the pitch, the loudness, and the character, quality, or *timbre* of a sound. The mechanical problem of telephony then is, given an air-vibration which presents these three characteristics in any determinate way, to reproduce a similar air-vibration at a distance; then this, being received by the ear, will be perceived as sound. Under the most complex vibration no particle of air can be in more than one place at once: hence the net result of superposition of the most complex possible series of vibrations, from single melody or smooth harmony to the most complicated noise or the most delicate inflexion of the human voice, is a movement of each air-particle which may be represented by a curve of an apparently irregular form, lying alternately above and below a straight line which threads the curve and represents the position of the air-particle when undisturbed. The reproduction of this irregular resultant motion is the most general form of the problem: the earliest attempts were confined to the reproduction of the frequency of a vibration—i.e. the pitch of a sound, the first of the particulars above mentioned. In 1860 Reis of Frankfort first attacked the problem: he used a collodion membrane, upon which the sound-waves produced by the voice were made to impinge; this membrane, vibrating under their influence, alternately displaced and liberated a lever, which alternately made and broke the circuit of a galvanic battery; the intermittent current thus produced acted upon a distant electro-magnet which alternately attracted and failed to attract its armature; the armature thus oscillated, and a wing or plate attached to it acted upon the air, which was thus set in vibration, reproducing the pitch of the original tone or the inflection of the original voice. It appears from recent inquiry that Reis actually did more than this; but the next step is attributed to Mr Elisha Gray of Chicago, who sent successions of electrical current of varying strength as well as of varying frequency into the circuit, and thus enabled the relative loudness as well as the pitch of sounds to be transmitted; and who afterwards took the important step of using the variations of a steady current. These variations, positive and negative, are capable of representing all the back-and-fore variations of position of a particle of air, however irregular these may be: and he secured them by making the sound-waves set a diaphragm in vibration; this diaphragm carried a metallic point which dipped in dilute sulphuric acid; the deeper it dipped the less was the resistance to a current passing through the acid, and *vice versâ*: so that every variation in the position of the diaphragm produced a corresponding variation in the intensity of the current: and the varying current acted upon a distant electro-magnet, which accordingly fluctuated in strength, and in its attraction for a piece of soft iron suspended on a flexible diaphragm: this piece of soft iron accordingly oscillated, pulling the flexible diaphragm with it; and the variations of pressure in the air acted upon by the diaphragm produced waves, reproducing the characteristics of the original sound-waves, and perceived by the ear as reproducing the original sound or voice. Mr Gray lodged a *caveat* for this contrivance in the United States Patent Office on 14th February 1876; but on the same day Professor Alexander Graham Bell filed a specification and drawings of the original Bell telephone. In this the flexible diaphragm upon which the sound-waves impinge bore a small bar-magnet, which was thus made to oscillate; it oscillated in the immediate neighbourhood of the pole of an electro-magnet round which passed the continuous current of a battery;

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the oscillation of the bar-magnet in the neighbourhood of the pole caused fluctuations in the strength of the electro-magnet; these fluctuations caused variations in the intensity of the current passing continuously round the electro-magnet, and away to the distant receiver; there the varying current found an electro-magnet to act upon, and this exerted varying tension upon a soft-iron diaphragm. Later on Bell disclaimed the use of a non-metallic flexible diaphragm in the transmitter, and used only a soft-iron diaphragm; and he also used a permanent magnet instead of an electro-magnet in that instrument, it being found that currents of sufficient intensity were produced thereby. He also used similar instruments at both ends of the line. For these two later modifications priority is claimed on behalf of Professor Dolbear. Mr Edison secured the requisite variations of the current in another way. He found that lamp-black and certain other substances could be prepared in masses which were slightly compressible, resilient, and semi-conductive, and which varied in conductivity as they became exposed to greater or smaller pressures; and that the variations in conductivity were very satisfactorily proportional to the variations of pressure. The vibrations of the diaphragm were accordingly made by him to concentrate themselves upon a small button of such a substance, and thus to induce variations in the conductivity of the circuit.

At the present time instruments of the Bell telephone type are mainly used as receivers only. In the Bell receiver itself both poles of the magnet are now brought into proximity to the magnet; and the instrument may be flattened down into the form of a watch. In the Gower receiver the form is also watch-shaped, and the sound is conveyed to the ear by tubes. In the Ader receiver the electro-magnetic field acting upon the ferrotype iron diaphragm is improved, being rendered more intense and more uniform by a ring of soft iron placed outside the diaphragm. In other receivers devices are applied for economising wire, for decreasing the magnetic resistance of the magnetic circuit, for facilitating construction and regulation, &c. The transmitter is now almost always some modification of the Microphone (q.v.). Edison's instrument, above described, is in substance a microphone; it is, however, not operated by shaking the whole apparatus as in the original Hughes microphone, but by bringing variations of pressure to bear upon the carbon button. In the Blake transmitter the same principle is applied; the current of a battery passes through the button, and is there made to vary, and it also passes through the primary winding of an induction coil: the variations are taken cognisance of by the secondary winding which transmits them, adequately intensified, to the general circuit. The Crossley, the Gower, and the Ader transmitters are more obviously adaptations of the Hughes microphone, with eight, sixteen, and twenty loose contacts respectively instead of two, and attached to the under side of the vibrating diaphragm, which in the Gower and the Crossley is a thin sheet of wood. Other types are the Johnson, which is provided with a shunt so as to adjust the current transmitted, and thus prevent buzzing; the Hunnings, in which powdered coke is used; the Swinton, which depends on swinging carbon rods resting by loose contacts against a carbon bar, there being thus no diaphragm in the popular sense, though the English courts have decided that the carbon rods are mechanically equivalent to a diaphragm; and Thompson's valve transmitter, in which a ball of carbon rested upon three carbon buttons and was impinged upon by air-waves from beneath.

The word 'telephone' is now usually applied to the complete instrument, comprising the transmitter, the receiver, and the various subsidiary appliances, such as switch bells worked by a battery or by a small magneto-electric machine, driven by a crank for signalling purposes. The arrangements which have to be devised for the purposes of a central telephone station increase rapidly in complexity with the number of subscribers. For these, and for the means adopted to minimise the effects of induction from neighbouring wires, &c., the reader may consult Allsop's *Telephones* (1891), and then Preece and Maier, *The Telephone* (1889).

Of the five leading telephone patents for Great Britain, the last, the Crossley transmitter, was to expire 1st February 1893. In 1880 (21st December) Mr Justice Stephen decided in favour of the British Post-office that telephony was a form of telegraphy. Since that decision telephony has been carried on in Britain under the Postmaster-general's license, on payment of one-tenth of the gross receipts. The United (now the National) Telephone Company, using mostly Blake transmitters and Bell receivers, has preserved its mastery over the patent rights by means of an unexampled amount of litigation. The question has been much debated whether the government should not acquire the telephone system, the most favoured solution of the problem being that the government should take over the trunk lines from town to town, leaving the telephone companies to do intra-urban and other local work. In the year 1890, out of every 100,000 inhabitants, in Sweden 400 were telephone subscribers; in Switzerland, 316; in Luxemburg, 307; in Norway, 255; in Germany, 105; in Denmark, 90; in Belgium, 88; in the Netherlands, 75; in Great Britain, 58; in France, 41; in Spain, 40; in Italy, 34; in Portugal, 26; in Austria-Hungary, 21; in Russia, 7; and out of every 1000 inhabitants of towns, 47·4 in Luxemburg, 30·1 in Geneva, 18·2 in Christiania, 11·4 in Berlin, 7·1 in Antwerp, 6·5 in Rome, 4·2 in Paris, 4·0 in Milan, 4·0 in Brussels, 2·6 in Madrid, 1·9 in Naples, 1·5 in London, 1·3 in Vienna, and 1·2 in Barcelona. The longest line in Germany is Berlin-Königsberg, 360 miles; France, Germany, and Austria are well supplied with trunk lines, such as Paris-Bordeaux, Vienna-Pesth, Vienna-Trieste; and in England, Liverpool, Manchester, Bradford, Birmingham, &c. are connected directly with London, and there is an increasing number of other lines. The first London-Paris line was opened in March 1891, the charge being 8s. for three minutes' conversation. In Berlin the system of laying wires underground has been very thoroughly developed; there are 2520 miles of wires so laid. On the Continent the telephone is largely used by the rural post-offices; and in France any person may telephone from a call-office to a post-office, and his verbal message will be transcribed and sent on as a telegram. Very curiously, in the United States the microphonic transmitter patent only began to run its course of seventeen years in 1891; it had been deferred by reason of a dispute as to priority between Edison and Berliner, continued for thirteen years; the decision was given in favour of Berliner, but both of the competing patents belonged to the same company. In the United States the telephone is very extensively employed, and the distances run are great, up to 1000 miles, with specially thick wire.

Telerpeton, a remarkable genus of fossil reptiles, the relics of which have been found in fine-grained whitish sandstone of Triassic age quarried at Cummingston, near Elgin. A single species, or rather a single specimen, is all that as yet has been detected. It exhibits the skeleton complete, with the exception of the termination of the tail, but the bones have disappeared, and left

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only the casts as dark-coloured cavities in the pale-gray rock. Nearly perfect casts of their forms were taken by Dr G. Mantell from these hollow casts. The impressions are so well defined as clearly to show that there were twenty-six vertebræ between the skull and the sacrum, two sacral vertebræ, and the portion of the tail preserved on the slab consists of thirteen others. The ribs, of which there are twenty-one pairs, are very slender; they are short near the head, but quickly lengthen as they leave it. The reptilian nature of this fossil is evident. By Dr Mantell it was considered to be a batrachian, and described as *Telerpeton Elginense;* but Professor Owen has more correctly referred it to the lacertine type, because of the numerous ribs, the structure of the sacrum, and the form of the pelvis.

Telescope (Gr. *tēle-skopos*, 'far-seeing') usually consists essentially of a lens or mirror, to form within our reach a real image of a distant object suspended in space; and a Microscope (q.v.), to examine this image in detail. Anticipations of the telescope have been claimed for Roger Bacon (died 1294?); and Sir Richard Burton alleges that long ere this it was known to the Arabian scientists (see the supplement to his *Arabian Nights*). Leonard Digges, an English mathematician, very suggestively describes in his *Geometricall Practise* (1571) 'the marvellous conclusions that may be performed by glasses concave and convex, of circular and parabolic forms,' speaks of a separate volume (never published) describing 'the miraculous effects of perspective glasses,' and must be held to have at least anticipated the invention. Della Porta (died 1615) may have made a rude telescope. But the telescope from which all later ones proceed by lineal descent seems to be that presented to the General States of Holland on 2d October 1608 by the optician Hans Lippersheim or Lippershey of Middelburg—though possibly another optician, Zacharias Jansen, and the mathematician Adriaan Metius had also something to do with the development of this same telescope. The value of the invention was immediately realised; telescopes were being sold in Paris next year; and Galileo, hearing of the Dutchman's invention, made a telescope for himself, with which, the first night he used it (7th January 1610), he discovered three of Jupiter's moons. Kepler (1611) is the inventor of the astronomical telescope.

The way in which an inverted real image is formed by a lens is described under LENSES; see also MIRROR. The reason why it is necessary in a telescope to produce a real image which may itself be subjected to examination by means of a lens is the following: If a single magnifying lens, or an equivalent combination of lenses, be placed between a distant object and the eye, the image formed will not be thrown upon the retina itself, and nothing will be distinctly seen, unless indeed the eye is taken far enough back to see the minute real image itself. If, on the other hand, a real image be projected in space within our reach, a magnifying lens or combination of lenses can be made to examine that image as if it were an object, after the fashion of the Microscope (q.v.). If the eyepiece be equivalent to a single magnifying lens or simple microscope, the inverted real image will not appear to be re-inverted, and then what the eye sees on looking through the combination is an inverted magnified representation of the distant object, as in the astronomical *refracting* telescope; but if it be equivalent to a compound microscope, it will appear to re-invert the inverted real image under examination, and will thus furnish an uninverted representation of the object, as in the terrestrial telescope. The astronomical form is thus simpler than the terrestrial, and absorbs less light; and it is accordingly used for sailors' night-glasses. If the real image be formed by a concave mirror, a plane reflecting surface or secondary mirror may be interposed so as to turn back or turn aside the reflected rays before they have actually formed the real image, and thus to cause the real image to be produced in some place where it can conveniently be examined by a magnifying eyepiece. If the reflected rays be turned aside through 90° by a plane reflecting surface, the magnifying eyepiece will be at the side of the instrument; and then we have the Newtonian

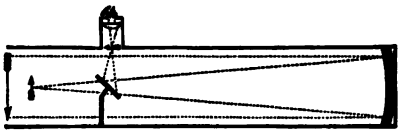

Fig. 1.—The Newtonian Telescope.

form of the astronomical *reflecting* telescope (fig. 1), exemplified by Lord Rosse's telescope. If the reflected rays be simply sent back along the axis of the instrument, they—or the central portion of them—may be allowed to pass through a small hole in the centre of the concave mirror, and dealt with by an eyepiece on the other side of that mirror; in which case we have the Gregorian form of the reflecting telescope (fig. 2), where the eyepiece is at

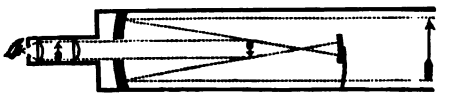

Fig. 2.—The Gregorian Telescope.

the end, as in the ordinary terrestrial telescope. If the concave mirror be tilted slightly to one side it will, without loss of light due to the intervention of a second mirror, itself bring the real image towards one side of the apparatus. There it may be examined by means of an eyepiece suitably placed, directed obliquely towards the mirror; and this is the Herschelian form of the instrument (fig. 3).

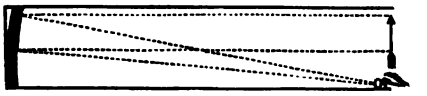

Fig. 3.—The Herschelian Telescope.

These are the three main forms of the reflecting telescope; they are subject to minor modifications, for which see works on practical astronomy.

A telescope cannot be made of invariable length, for two reasons. In the first place, for a given eye there is a fixed, most suitable distance between the eyepiece and the proper position of the real image to be examined by it. Wherever the real image happens to be formed, the eyepiece, simple or compound, must be moved into the proper relative position with regard to that real image; but the image of a nearer object is formed farther from a lens or from a concave mirror than is the image of a more distant object, for which reason the eyepiece of a telescope must be moved farther away from the objective or reflector in order to examine the image of a nearer object; and the telescope as a whole must be lengthened for nearer, or shortened for more distant objects. In the second place, the eyes of different observers may not be similar; each observer may have his own proper fixed distance between the eyepiece and

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the real image, according to his long-sightedness, short-sightedness, or normal vision. Consequently the distance traversed by the rays between the objective or mirror and the eyepiece is always made adjustable by sliding tubes or otherwise.

When a telescope is in 'focus' a pair of cross-fibres, placed in the focus of the eyepiece, will appear to retain a fixed position with regard to any point of the object as seen through the telescope, even though the eye of the observer be moved up and down or from side to side. This is called the parallastic method of focussing. By substituting for a given eyepiece others of different magnifying powers, the magnifying power of a telescope as a whole may be varied. The magnifying power of a telescope is the ratio between the focal length of the objective and that of the eyepiece. For suppose an object, say a chimney-stalk, 100 feet high at 10,000 feet distance, and the telescope directed towards the bottom of it, the angle subtended by the object, from the point of view of the objective-lens, at the crossing-point of the rays from the top and the bottom of the chimney-stalk, will be a little over 34′, an angle whose tangent is $\frac{1}{10000}$. If the objective could be supposed to look backwards and to see the real image produced by it in the body of the telescope, that image would again subtend an angle of 34′, and there would not be any magnification, for the visual angle subtended would be the same. If the image were produced at 1 foot from the crossing-point of the rays, it would have an actual length of $\frac{1}{10000}$ foot or $\frac{1}{25}$ inch. But after passing through the eyepiece the rays from the virtual image of the whole object would tend to enter the eye of the observer at the same visual angle as the rays from the top and the bottom of the real image of the chimney would cross one another in their transit through the eyepiece if it were a real object there situated; and so we may look at the matter as if that crossing-point in the eyepiece were itself the organ of vision. From that point the real image of the size mentioned at say ½ inch distance would subtend an angle of 13° 30′, or an angle whose tangent is $\frac{1}{240000}$, or twenty-four times the preceding. But the apparent size is proportional to the tangent of the visual angle measured with reference to the axis of the system; hence the magnification here is as 24 to 1, or as 1 foot (the focal distance between the real image and the objective) is to ½ inch (that between the real image and the eyepiece). If in this last case the aperture of the object-glass had been the same as that of the pupil of the eye, the magnification would not have been affected; but there would have been a lack of illumination, because an equal amount of light from the same source would have been made to produce on the retina an image about twenty-four times as large linearly, or 576 times superficially.

If, however, in the case supposed, the objective be twenty-four times as great in diameter as the pupil of the eye, this is—apart from loss of light by absorption in the lenses—compensated for, and the illumination is restored. With lenses of larger diameter than is necessary to compensate the loss of illumination by magnification, the field appears brightly lit. Where there is no loss of illumination through magnification, as in the case of stars, which are too far to be magnified into appreciable discs, the increase of brightness in the objects viewed enables objects to be seen which make no impression upon the naked eye. Suppose a star to be so far as to be visible and no more; then another equal star, ten times as far, would appear to shine, under the law of inverse squares (see LIGHT), with one-hundredth the intensity of the former, and would be invisible to the eye; but if its light were collected over an area a hundred times as great as that of the pupil, and sent into the eye, the eye would again be just enabled to perceive it; and in order to secure this hundred-fold area the diameter of the objective must be ten times that of the pupil of the eye. The space-penetrating power of a telescope is therefore—assuming that there is no loss of light in the telescope itself, which is not the case—directly proportional to the diameter of the objective.

The Opera-glass (q.v.) is often described as a form of telescope under the name of Galileo's telescope; and, while it does not magnify greatly, it is very serviceable in collecting much light and brightening the field. Mr Francis Galton says (*Vacation Tours in South Africa*, chap. ix.) that a large opera-glass is 'one of the most perfect of night-glasses, besides being the most useful of telescopes.'

As to the unavoidable imperfections of the telescope, we find in the first place that even with a mirror, as in a reflecting telescope, where we are not annoyed by the breaking up of white light into its component colours, since the Law of Reflection (q.v.) is the same for all rays, it is impossible to form a perfectly sharp image of more than *one* definite point at a time. In order to do even this the mirror must be formed as part of the prolate spheroid produced by the rotation, about its longer axis, of an Ellipse (q.v.), one of whose foci is the object-point, the other the image. If the object-point be, like a star, practically at an infinite distance, the requisite form of the mirror is that formed by the rotation of a Parabola (q.v.) about its axis. The axis of the mirror must then be directed to the object-point, and all rays from it will, after reflection, pass accurately through the focus. But this is not strictly true for any other object-point in the field of view, although it is so nearly true that no inconvenience is practically found to result. But if the mirror used be part of a sphere, no point can be found such that rays diverging from it shall all be brought after reflection accurately to one point of the image; and this defect, called *Spherical Aberration*, increases with the surface of the mirror of any given radius; so that by increasing that surface, for the attainment of brightness, we increase proportionally the indistinctness of the image. To give an idea of the delicate manipulation required in the construction of a reflecting telescope we take the case of a speculum of 4 feet aperture and 40 feet focus, as calculated by Sir J. Herschel. If this be first ground to a truly spherical form it must have a radius of 80 feet. Now, such a mirror will give a very indistinct image, even under the most favourable circumstances; yet to grind it to the parabolic form, which is practically perfect, leaving the middle untouched, and grinding more and more away from its surface as we proceed outwards to the edges, even at the edges we have to remove a film of metal of only the $\frac{1}{71333}$d part of an inch, somewhere about the $\frac{1}{100}$th part of the thickness of the paper on which this is printed! The spherical aberration is partly compensated in Cassegrain's modification of Gregory's telescope, in which the small secondary mirror is convex.

Lenses, whether the object-lens or the eye-lens, have this defect also; but, as a rule, the most conspicuous fault of single lenses is their *Chromatic Aberration*, which arises from the different refrangibilities (see REFRACTION) of the various coloured rays, and leads to the formation, by a lens, of separate overlapping images of a bright object for each coloured ray. The remedy consists in *achromatising* (see ACHROMATISM, REFRACTION) the lens—i.e. forming it of two or more lenses of different kinds of glass, so that the colours, separated by one, shall be reunited by the others.

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The curvatures of the lenses which make up the achromatic combination, and the distances between them, may be so chosen as to minimise the effects of spherical as well as of chromatic aberration. Galileo's telescope has less chromatic and spherical aberration than the common astronomical telescope, and is shorter, since the distance between the lenses is approximately the *difference*, not the *sum*, of their focal lengths.

Before the discovery of the possibility of forming an achromatic lens Huygens, Cassini, and others had endeavoured, by enormously increasing the focal length of the object-glass of the common astronomical telescope in proportion to its diameter, to get rid as far as possible of chromatic aberration.

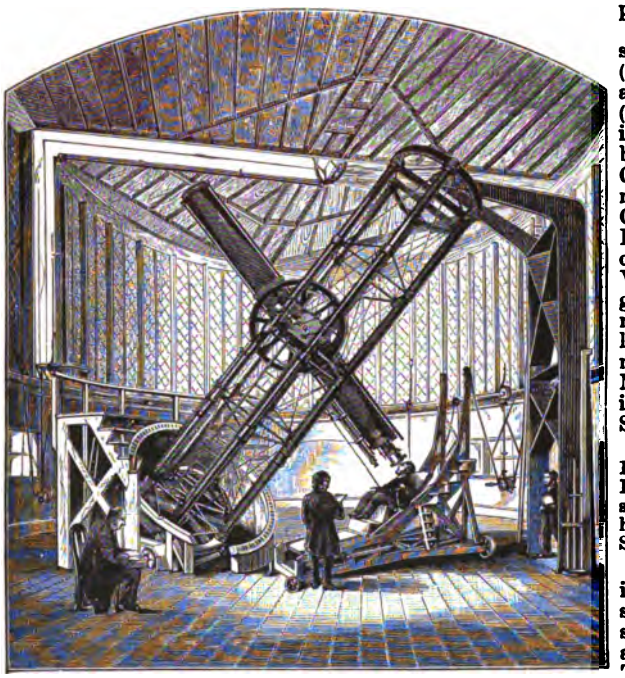

Fig. 4.—The Great Equatorial Telescope at Greenwich Observatory (from Dunkin's *The Midnight Sky*).

They thus formed the *aërial* telescope, in which the object and eye lenses were mounted separately on stands; the tube (which would have been 100, 200, or even 600 feet long) being dispensed with. Valuable work was done with some of these telescopes, of 125 feet focus, but the longer ones proved unmanageable. The principle involved in these constructions is, practically, the throwing the magnifying power more on the object-lens than on the eye-lens; for the image formed by the former was still so imperfect as not to bear much additional magnification. The great step required for shortening the unwieldy instrument was therefore the perfecting of the object-lens, by achromatisation. Various very ingenious improvements on achromatic combinations, which might even yet be thought worthy the consideration of opticians, were devised by Dr Blair. He found solutions of mercury or antimony in hydrochloric acid to be much more refractive and more dispersive than crown-glass, while no irrationality of dispersion as compared with crown-glass could be detected in them. By means of lenses filled with these liquids he was enabled to give the telescope an aperture of one-third of its focal length without a trace of residual colour.

The process of Liebig for depositing on glass an exceedingly thin film of silver, which, by careful polishing, can be rendered more highly reflective than any other material, has been taken advantage of by Steinheil in the construction of large specula for reflecting telescopes. This is an immense step, since any disc of glass will do, its optical properties not being employed; while, if it be once brought to a true parabolic figure, the silvering may be renewed as often as may be required. One of the great difficulties in the construction and working of large reflectors has hitherto been the casting and annealing of metallic masses of some tons weight. This, in the silvered specula, is entirely avoided. We cannot here enter into a description of the processes, often extremely ingenious, which have been devised for the grinding, figuring, and polishing of lenses and specula.

Amongst the largest reflecting telescopes are those of Lord Rosse at Birr (72 inches aperture, 1844), Mr Commons, at London (1889, 60 inches), Bessemer (50½ inches), Sir William Herschel (48 inches, 1789, long since dismantled), Melbourne University (48 inches), Paris Observatory (47 inches). To the largest refracting telescopes belong those of Lick Observatory, California (36 inches, 1880), Pulkowa (30), Nice (30), Greenwich (28, of which a figure is here given), Paris (27), Vienna (27). Among the most distinguished makers of great telescope lenses may be named Sir Howard Grubb in England and Alvan Clark in America. The making of optical glass, for which the Messrs Chance of Birmingham are famous, is described at GLASS, Vol. V. p. 244. See also EQUATORIAL, OBSERVATORY.

See an address by Sir Howard Grubb, Royal Institution, 2d April 1886; *Nature*, xxxiv. 85. For the subject in general, see Sir John Herschel's *Telescope*; and for the history, the histories of astronomy and the monograph by Servus, *Geschichte des Fernrohrs* (1885).

Telford, THOMAS, engineer, was born in Westerkirk parish, Eskdale, Dumfriesshire, on 9th August 1757, the son of a shepherd; and during the intervals of his attendance at school young Telford or Telfer (so he was registered) followed the same calling, diligently employing his leisure moments in the perusal of whatever books were within his reach. At fourteen he learned the trade of a stone-mason at Langholm. In 1780 he removed to Edinburgh, and in 1782 to London, obtaining employment under Sir William Chambers on the erection of Somerset House. In 1784 he was appointed to superintend the erection of the resident commissioner's house at Portsmouth dockyard, a work which afforded Telford the opportunity of mastering the details of construction of docks, wharf-walls, &c. In 1787 he was appointed surveyor of public works for Shropshire; and his two bridges over the Severn at Montford and Buildwas gained for him the planning and superintendence of the Ellesmere Canal, to connect the navigation of the Severn, Dee, and Mersey (1793–1805). In 1790 he was appointed by the British Fishery Society to inspect their harbours; and in 1801 he received a commission from government to report on the public works required for Scotland. As a consequence the construction of the Caledonian Canal (q.v.) was entrusted to Telford, who also executed more than 1000 miles of road in the Highlands, Lanarkshire, and Dumfriesshire, and about 1200 bridges, besides churches, manses, harbours, &c. His next great work was the road from London to Holyhead, including the erection of the

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Menai Suspension Bridge (see BRIDGE), and the last was the St Katharine's Docks (1826–28) in London. Among other works by him are, of bridges, the Conway, the Broomielaw at Glasgow (1833–36), and the Dean in Edinburgh (1831); of canals, the Macclesfield, the Birmingham and Liverpool Junction, the Gloucester and Berkeley, the Weaver system, the great tunnel (1¾ miles long) on the Trent and Mersey; of harbours, Wick, Dundee, Peterhead, Banff, Fraserburgh, Fortrose, Cullen, Kirkwall, and Aberdeen. He was the first president of the Institute of Engineers; he supplied the nucleus of a library, and left towards it its first bequest of £2000. By Southey he was termed 'the Colossus of Roads' and 'Pontifex Maximus.' He died at Westminster, 2d September 1834.

See *Life* by himself (1838), which contains some specimens of Telford's homely poetry in its appendix, with its accompanying folio atlas of plans; and Smiles's *Lives of the Engineers* (vol. ii. 1861).

Tell, a district in the extreme north-west of Africa, stretches along the shores of the Mediterranean, and comprehends the corn-growing tracts extending south from the Mediterranean to the Atlas Mountains, and from west to east through Morocco, Algeria, and Tunis. The Tell is noticed under the articles MOROCCO and SAHARA.

Tell, WILLIAM, was, according to Swiss tradition, a countryman of Burglen in Uri, who early in the 14th century rescued his native district from the tyranny of Austria. The following is the generally accepted version of the story. Albert II., Duke of Austria and German emperor, was in 1307 striving to annex the Forest Cantons to his immediate possessions. Hermann Gessler, his *vogt* or steward, perpetrated atrocious cruelties on the inhabitants. Werner Stauffacher of Schwyz, Walter Fürst of Uri, father-in-law of Tell, and Arnold Melchthal of Unterwalden met on the Rütli Meadow, 7th November 1307, and solemnly swore they would expel their oppressors before the following New-year's Day. Gessler had placed the ducal hat of Austria on a pole in the market-place of Altorf and intimated that any one who passed it without uncovering would be punished without mercy. Tell and his boy failed to do reverence to the hat, and were sentenced to be put to death unless Tell, who was a famous bowman, could hit an apple placed on his son's head. Tell performed the feat. 'What,' asked Gessler, 'would you have done with the second arrow in your bow?' 'Shot you if I had killed my child,' was the reply. Tell was bound and thrown into a boat to be taken with Gessler and his men to the Castle of Küssnacht, the residence of the tyrant. A frightful storm burst forth. Tell alone could save the party. He was unbound and pulled the boat to a rocky ledge, 'Tell's Platte;' he there sprang on shore and disappeared. The tyrant landed and was passing through a defile, the 'Hohle Gasse' near Küssnacht, when Tell, who lay in ambush, shot him through the heart. A rising followed, and wars with Austria, which ended in the independence of Switzerland.

The story was told as true by Johannes von Müller in his great history of Switzerland. Schiller made it the subject of his greatest drama and Rossini of his best opera—and 'the patriot Tell' became the best-known hero the world had seen. Doubts, however, had been expressed as to the very existence of Tell. Already in 1754 Voltaire had cast a characteristic sneer at 'the apple story,' and in 1760 Freudenberger, a Bernese Protestant clergyman, published a pamphlet, *Tell, a Danish Fable*, pointing out that the story of the apple is the Scandinavian fable of Toko. His work was condemned by the government of Uri and burned by the common hangman. The doubts were not extinguished. The comparative mythologists showed that the Tell story was merely a Scandinavian form of an old Indo-Germanic myth (see Ideler, *Die Sage vom Schusse des Tell*, 1826). An excellent parallel is that in our own north-country ballad, 'Adam Bell, Clym of the Clough, and William of Cloudesley,' printed in Percy's *Reliques*. The 'master-shot' indeed is not the property alone of Aryan folklore, but is found among Samoyeds, Turks, and Mongolians alike. It was further found that Tell is first mentioned in 1470 in a ballad, between 1482 and 1488 in the *Chronicle* of M. Russ of Lucerne, and in 1511 in a play acted in Uri. The first makes Tell the hero of the apple story and the rising which followed. Russ and the Uri play take no notice of the apple story, but refer to the boat scene and the atrocities of the bailiffs. They make Tell the hero of the revolution. A MS. known as the *White Book of Sarnen* first combined the apple story and the atrocities. It makes the Rütli oath the pivot of events, and Stauffacher, not Tell, the hero. Tschudi in his *Swiss Chronicle* (1572) first melted all these incidents into a consistent narrative. He fixed the date of the Tell rising at 1407, and Von Müller, warned by the fate of Freudenberger, with palpable misgivings told the tale as true history (see Vischer, *Die Sage von der Befreiung der Waldstädte*, 1867). There is no trace of Tell to be found in contemporary records. His name did not appear where it should have done in lists connected with the *landesgemeinden* of the period; in the register of deaths at Schaddorf it had been forged. The story that the Tell chapel on Tell's Platte was built by a *landesgemeinde* held in 1388 at which 114 men were present who had known Tell was first heard of in 1759. The Tell chapels at Bürglen and the Hohle Gasse, represented as existing since the 14th century, belong to the 16th. Professor J. E. Kopp of Lucerne has shown that the date of the Tell rising is inconsistent with the history of the Forest Cantons. There was then no grievance against Albert II., who was a severe but just ruler and never guilty of any atrocity (see Kopp, *Urkunden zur Geschichte der Eidgenössischen Bund*, 1851). A complete record has been published of all the occupants of Küssnacht from 1250 to 1513. Among them there is no Gessler (see Rochholtz, *Tell und Gessler in Sage und Geschichte*, 1876). In short, there is no truth in any incident of the Tell legend. Although inconsistent with history, they, however, are not yet generally recognised as mythical. The people of the Forest Cantons cling even to the apple story. In 1890 a ferment was raised in Uri by the publication of a school history of Switzerland which did not mention Tell and the Rütli oath. Excellent French works on general history still represent all the incidents as historical, expressing a mere doubt as to the apple story; this is justified in a long article in the *Nouvelle Revue* of July 1891. It attributes disbelief in Tell to a conspiracy of German savants actuated by sycophancy, jealousy, and antipathy to liberal ideas. At the sex-centenary of Swiss independence celebrated in August 1891 truth and fiction were ingeniously blended, and the patriots of Uri were compensated for the scepticism of 'German professors' by the abiding faith of newspaper correspondents. See Albert Rilliet, *Les Origines de la Confédération Suisse, Histoire et Légende* (1868).

Tellez, GABRIEL, better known by his pen-name of *Tirso de Molina*, a Spanish dramatist of great reputation, was born in Madrid in 1585, entered the order of the Brothers of Charity at Toledo, and died prior of the monastery of Soria in 1648. Tellez was a friend and pupil of Lope de Vega,

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whom he almost rivalled in facility of execution. His pieces are partly *Comedias*, partly Interludes, and *Autos Sacramentales* (originally about 300, of which but few survive), all displaying dramatic vitality, originality, and power of character-painting. The wit is rich and natural, and the language highly poetical. Some of his comedies still keep the stage. Among the best are *El Burlador de Sevilla* (*Don Juan*), *El Vergonzoso en Palacio*, *Don Gil de las Calzas Verdes*, and *Marta la Piadosa*. The best edition of his works is that of Hartzenbusch (12 vols. Madrid, 1839–42); there is a selection in the *Biblioteca de Autores Españoles* (vol. v. 1850). See a monograph by Muñoz Peña (Madrid, 1889).

Tellicherri, a seaport town and military station of British India, in the district of Malabar, Madras Presidency. The site of the town is very beautiful, and the neighbouring country highly productive. There is a natural breakwater abreast of the fort, formed by a reef of rocks running parallel to the shore. The town, with suburbs, occupies about 5 sq. m. Coffee, cardamoms, and sandalwood are the chief exports. The East India Company founded a factory here in 1683, which was reduced to a residency in 1766. Pop. 26,410.

Tel-lo. See BABYLONIA.

Tellurium (sym. Te, equiv. 128) is a chemical element, which some authorities place among the metals, and others among the non-metallic bodies or metalloids. Although in its outward characters it closely resembles the metals, its close analogies with sulphur and selenium indicate that its true place is amongst the metalloids. It possesses a high metallic lustre, and is bluish white in colour; it melts at about 932° (500° C.), and at a higher temperature is converted into a yellow vapour; it is a bad conductor of heat and electricity, and is very brittle. Its specific gravity is 6·24. When strongly heated in the air it burns with a blue flame and gives off white fumes of tellurous acid. Like sulphur and selenium, it is soluble in cold oil of vitriol, to which it gives a fine purple-red colour, and on dilution it is precipitated unchanged; in these respects it differs from all metals. In nitric acid it dissolves with oxidation.

Tellurium forms two compounds with oxygen —viz. *Tellurous acid*, TeO_2, and *Telluric acid*, TeO_3, corresponding to the oxides of sulphur. *Tellurous acid* exhibits very slight acid properties, and in the anhydrous state it combines with acids, and acts the part of a weak base. These salts have a metallic taste, and are said to act powerfully as emetics. The *telluric acid* has only a feeble affinity for bases, but it forms salts, which contain 1, 2, and 4 molecules of the acid to each molecule of base. Tellurium unites with hydrogen to form telluretted hydrogen, H_2Te, which is a gaseous body, analogous to sulphuretted hydrogen, and precipitates most of the metals from their solutions in the form of tellurides, which have a close analogy with the corresponding sulphides.

In experimenting upon the action of the salts of tellurium, it has been found that they possess the power of forming, in the body of a healthy person, compounds which impart to the breath, to the perspiration, and to the gases generated in the intestinal canal a disgusting fetor, which makes him a nuisance to every one he approaches; and this smell may last for weeks, although the quantity of tellurium that was administered did not exceed a quarter of a grain.

Tellurium is a rare substance, found chiefly in Transylvania, but discovered in other parts of Hungary, in North America, and in the Altaï silver mines. It sometimes occurs native, but more commonly as a telluride of gold, lead, or silver.

Telpherage. See ELECTRIC RAILWAY.

Telugu. See INDIA, Vol. VI. p. 103.

Tembu. See KAFFIRS.

Temesvar, a royal free city of Hungary, consisting of the fortified city or 'citadel,' with four suburbs, on the Bega Canal, 160 miles SE. of Pesth by rail. It has a fine cathedral, an ancient castle, a magnificent episcopal residence, manufactures of flour, tobacco, cloth. silk, paper, leather, wool, and oil, and a brisk transit trade in grain, wax, honey, and brandy with Transylvania, Servia, and Roumania. Temesvar has endured a great number of sieges—the latest being that of 1849, when it was besieged and bombarded for 107 days by the Hungarian insurgents, but was relieved by Haynau. Pop. (1880) 33,694; (1890) 39,850.

Tempé, a famous mountain-gorge, some six miles long and 100 to 2000 paces broad, in the north-east of Thessaly, between the mountains of Olympus and Ossa. The river Peneus forces its way through the rocky ravine to the sea, and along its right bank runs the track, at some points hewn out of the rock. The vegetation is so rich and the scenery so grand that the name of Tempe became in ancient times a synonym for any beautiful valley, as the Tempe near Reate through which flowed the Velinus, and the Tempe in Sicily formed by the Helorus. Tempe was a favourite haunt of Apollo.

Tempera. See DISTEMPER.

Temperament is a term which has been employed in Physiology ever since the time of Galen, to designate certain physical and mental characteristics presented by different persons. A fourfold classification was long universal, doubtless based on the old idea of four corporeal elements (see MEDICINE, Vol. VII. p. 116). But the two generally regarded as fundamental are the *sanguine* and the *melancholic*, the *phlegmatic* being a degree or modification of the sanguineous, and the *choleric* of the melancholic.

Some writers recognise a *nervous* temperament, in which the predominating characteristic is a great excitability of the nervous system, and an undue predominance of the emotional impulses—a temperament always associated with the sanguineous or the melancholic. The names of the jovial, mercurial, and saturnine temperaments are reflections of Astrology (q.v., Vol. I. p. 525). The artistic temperament is also a very current phrase. In both sexes the characteristics of the temperaments are far less manifest in old age than in earlier life. The different temperaments often merge so gradually into one another that very often it would be extremely difficult to decide to which variety any special case belongs.

Temperament is a system of compromise in the tuning of keyed instruments. Though the various intervals of the scale are spoken of broadly as consisting of tones and semitones, the successive tones are not all equal when given in just intonation according to harmonic law—i.e. so that the consonant intervals are in perfect tune; and as every note in the scale may become the keynote of another scale, if all these scales are to be given exactly a complete set of keys for each would be necessary. But it has been found in practice that by only a slight deviation from just intonation a much more limited keyboard, of twelve notes to the octave, gives results which do not offend the ordinary ear, though the discrepancy is distinguishable by a trained one. Up till about the beginning of the 19th century in Germany, till 1835 in France, and 1846 in Britain, the system adopted

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was that known as *mean* temperament, by which the intervals in some keys were more exactly in tune than in others; some of the intervals in the less favoured keys, known as *wolf* intervals, being so unpleasantly out of tune as to cause composers to avoid these keys. This was remedied in a few instances by the use of two divided keys, one of which gave separately D♯ and E♭, and the other F♯ and G♭. The present practice, known as *equal* temperament, makes each tone and semitone in the octave approximately equal, so that every key is equally available; while at the same time every interval except the octave deviates slightly from just intonation. This deviation is more obvious on the organ, or still more the harmonium, than on the pianoforte; but it is of more practical moment in the orchestra, where keyed instruments are heard along with others playing in just intonation. There are many advocates of a system of just intonation, at all events as applied to special instruments; and various keyboards have been invented to obviate the mechanical difficulties. The subject is still a favourite battlefield of theorists. See Bosanquet on Musical Intervals and Temperament, and Helmholtz' *Sensations of Tone*.

Temperance. The moral codes of the great religions of the world have either enjoined abstinence from intoxicating drinks or have inculcated that strict sobriety which such abstinence secures; so that a very large, if not the larger, proportion of the human race has always avoided the use of such liquors. But their manufacture and consumption have, nevertheless, prevailed to such an extent as often to call for special methods of cure or prevention. During the 18th century the ravages of what Mr Lecky has called the 'gin epidemic' led to measures of a persuasive and legislative character, designed to check this social pest. Dr George Cheyne (1671–1743) was one of many medical practitioners who, early in the 18th century, denounced the use of ardent spirits; while men such as Dr Samuel Johnson and John Howard set an example of abstinence from all inebriating drinks. Dr Beddoes of Bristol, Dr Thomas Trotter (physician, to the Royal Navy), and Dr Erasmus Darwin were also advocates of the same practice. John Wesley forbade the members of his society to use 'drams,' and denounced the common vending and use of spirituous liquors in the strongest terms. Dr Benjamin Rush of Philadelphia endeavoured to promote a common action among the leading Christian bodies of the United States against the use of spirits as a beverage; early in the 19th century various resolutions were adopted by American church synods and associations; and the Massachusetts Society for the Suppression of Intemperance was formed early in 1813. Even prior to this a society formed at Moreau, New York state, April 30, 1808, excluded both spirits and wine except medicinally, or wine except at public dinners or in the Lord's Supper. In 1809 an Anti-Spirit Society was established at Greenfield, N.Y., and in 1818 at Hector, N.Y. There seems also evidence that at Skibbereen in Ireland there was established as early as 1817 a sort of benefit society on the basis of abstinence from all intoxicating drinks. No doubt there were likewise on both sides of the Atlantic not a few men and women who never or rarely touched any kind of alcoholic drink; but there was still an absence of any general and combined movement against the ordinary use of even distilled spirits. This lack was supplied by the formation of the American Temperance Society at Boston on February 13, 1826; and therefore to this event must be referred the origin of what is now known as the temperance movement, described by De Quincey as 'the most remarkable instance of a combined movement in society which history, perhaps, will be summoned to record.' The leaders of the American Temperance Society included many of the chief ministers and professors of the country; the *Journal of Humanity* became its weekly organ in 1829, up to which time eleven state societies with numerous local branches had been formed, having a membership of about 100,000 persons, of whom 1200 had been reclaimed from habits of intemperance. It was reported that fifty distilleries had stopped, and that at least 400 persons had abandoned the traffic. In the following five years the temperance cause in the United States made amazing advances, and this was especially the case in New York state, where Mr E. C. Delavan of Albany published the *Temperance Recorder* and the *American Temperance Intelligencer;* these circulated far beyond the state, which claimed 1652 societies in 698 towns, with 320,427 members. In this one state 1472 persons had ceased to sell spirits, and some towns were entirely free from the traffic. It had, however, become apparent that the limited terms of the pledge as one against distilled liquors only could not cope with the evil, for breweries began to increase, and much spirit was disguised and sent into the market under the name of 'wine.' The leaders of the cause became at length convinced that it was necessary to direct the attack against every form of intoxicating drink; and this conviction was strengthened by what had been taking place in the British Isles.

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Professor Edgar of Belfast learned, in the summer of 1829, of the work of the American Temperance Society, and on the 14th August a communication from him appeared in the *Belfast Newsletter*, calling upon the Christian public of Ireland to follow the example thus set. This led the Rev. G. W. Carr of New Ross, Wexford, to hold a meeting, August 20, and form a society in the Friends' Meeting-house of that town. On September 24 the Ulster Temperance Society was formed in Belfast, and at the close of the year 25 societies with 800 members had been organised, chiefly in the north of Ireland. The Dublin society issued in November the first of a series of tracts. In the following five years the Irish movement spread widely, and many societies, chiefly composed of Protestants, were formed—some on the basis of total abstinence, mainly due to Mr John Finch of Liverpool. In Scotland Mr John Dunlop, of Greenock, found an able coadjutor in Mr William Collins, who, with other friends, formed the Glasgow and West of Scotland Temperance Society, November 12, 1829. Two ladies had already founded a small women's society at Maryhill near Glasgow. Before the close of 1830 Scotland possessed 127 societies with 23,000 members; and the *Temperance Society Record* appeared monthly in 1830–35. In Scotland, as elsewhere, it was felt that to be effective action must be taken against fermented as well as distilled liquors.

The first temperance society in England was formed at Bradford, Yorkshire, on February 2, 1830, the chief mover having been Mr Henry Forbes, who had signed the pledge at Glasgow; and the Bradford society became the mother of others. At Stockton Heath, near Warrington, a society was established April 4, and at Manchester May 12. Societies were also formed at Bristol, Liverpool, Leeds, York, and Newcastle-on-Tyne; and the London society was converted in 1831 into a national association, under the name of 'The British and Foreign Temperance Society.' In 1834 Mr J. S. Buckingham, who was returned for Sheffield to the first Reform parliament, succeeded in obtaining a select committee of the House of Commons

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to inquire into the causes, extent, and remedies of drunkenness. In the meantime the limitation of the pledge to abstinence from ardent spirits had proved a greater drawback than in other countries, because beer had for centuries been the popular beverage, and its use a cause of wide-spread drunkenness before ardent spirits were commonly sold. It was also an unfortunate coincidence that the Beer Act of 1830 had led to the opening of many thousands of new houses for the consumption of beer on the premises, and had aggravated the previous evils of the liquor traffic, contrary to the hopes of the framers of the bill, who thought it would diminish the use of ardent spirits and substitute for them 'good malt and hops which could injure nobody.'

Temperance societies on the anti-spirit basis had at the close of 1835 been established in all the British-American and Australian colonies, in India, the West Indies, the Sandwich Islands, the South Sea Islands, and in some continental countries, especially some parts of Germany and Sweden; and this continental movement was soon afterwards extended to Prussia, Russia, and Denmark. In British North America abstinence from all alcoholic beverages was common even under the old form of pledge, and on May 25, 1832, at St John, New Brunswick, a society was formed with a constitution expressly committing its members to abstinence from all intoxicating liquors, save as a medicine. It was, however, reserved for the Preston Temperance Society in England to apply such missionary power in the diffusion of the total abstinence principle as to justify for it the supremacy in the advocacy of the new reform. On September 1, 1832, seven members of the Preston society allowed Mr Joseph Livesey to attach their names to a pledge of total abstinence, and in later days it became common to speak of 'the seven men of Preston' as having commenced the new crusade. In fact, however, Mr Joseph Livesey was the only one of the seven who became greatly distinguished in this cause, his real Preston compeers being James Teare, Henry Anderton, Edward Grubb, Thomas Swindlehurst, and some others. The Preston society adopted both pledges, and it was not till 1835 that it resolved to make the total abstinence pledge a test of membership; but a Youths' Society had been formed in 1834 on the single basis of total abstinence. In the September of 1833, at one of the meetings of the Preston society, a working-man named Richard Turner, usually called 'Dicky Turner,' and who was a rough, humorous speaker, was insisting on the superiority of total abstinence over what was known as the 'moderation' system, and wishing to express himself very forcibly, he exclaimed, 'I'll be reet down out-and-out tee-tee-total for ever and ever.' The audience cheered, and Mr Livesey said, 'This shall be the name of our new pledge.' Dicky did not stutter, and the reduplication of the 't' in 'total' was simply an emphatic way of declaring his opinion. A conference of Lancashire and Cheshire societies was held at Manchester, September 24, 1834, when as a second pledge one of total abstinence was recommended; and at a second conference in Manchester, September 15 and 16, 1835, when thirty-one societies in Lancashire, Cheshire, and Yorkshire were represented, it was agreed to form the British Association for the Promotion of Temperance—the first general society in England on the total abstinence basis.

The years 1835–45 were years of great activity in the temperance cause throughout the world. In the United States the system of total abstinence was universally adopted in place of the limited anti-spirit principle. The American Temperance Union, with state and local societies in great numbers, continued the agitation, and laws affecting the liquor traffic were passed by several state legislatures. The Washingtonian Reform, which originated in Baltimore in 1840, was specially designed to reclaim the intemperate, and in the space of a few years it was estimated to have induced a quarter of a million of such persons to take the pledge. In England the British and Foreign Temperance Society practically ceased to exist. It had done much good work in its earliest years, but it would never accept a total abstinence pledge, even as a second one. In London the New British and Foreign Temperance Society was formed in 1836. It had adopted two pledges, one of simple personal abstinence called the short pledge, the other of abstinence coupled with a promise not to give strong drink to others, called the long pledge; and the disputes on this point rose to such a height that in May 1839 a division took place. Both societies unfortunately ran into debt, and in November 1842 they dissolved in favour of a new one, the National Temperance Society. In 1844 it organised a metropolitan temperance mission. District and county associations were organised in various parts, and by slow degrees a sentiment in favour of total abstinence, accompanied by its practice, became diffused throughout English society. One special line of labour was diligently prosecuted by Mr John Dunlop, who had settled in London, namely a movement in opposition to drinking usages in trades, especially those of a compulsory character. In Scotland the temperance cause had revived under the abstinence system; and at Falkirk, November 5, 1844, the Scottish Temperance League was founded, an event followed shortly after by the dissolution of the Western Temperance Union. But it is to Ireland that we must look at this period (1838–45) for the most extraordinary exhibition of temperance progress which any age or country has witnessed within an equal space of time. The total abstinence cause, though having many active and generous friends, had but slightly influenced the Roman Catholic population; but in the April of 1838 Father Mathew (q.v.) in Cork signed the total abstinence pledge at the instance of William Martin, a Quaker of that city. It is said in some books that Father Mathew's success as a temperance reformer was immediate; but the truth is that his work did not acquire a remarkable momentum till about the middle of 1839. During the next three years he visited nearly every part of Ireland, including the north, and administered the pledge to millions of men and women. The effect of his labours was visible in an enormous decrease in the consumption of spirits, as also in a lessening of drunkenness and the crimes arising out of it. In 1843 he visited England, giving the pledge to about 200,000 persons, including 60,940 in London. The first World's Temperance Convention, held in London in August 1846, was attended by 305 delegates, of whom twenty-eight were from the United States. It had been arranged by the National Temperance Society, which in 1856 was united with the London Temperance League. Since that date the N. T. League has been remarkably successful in carrying on temperance work among colleges and other educational bodies, as also in the army and royal navy. It has also held various congresses and conferences. By its means also various Nonconformist temperance societies have been formed. It has three organs—*Temperance Record* (weekly), *Temperance Mirror* (monthly), and *Medical Temperance Journal* (quarterly).

Although the temperance leaders in all places were almost invariably religious men, the great majority of Christian churches were not until of late years brought into recognised connection with the temperance movement. A ministerial temper-

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ance conference convened by the British Temperance Association was held in Manchester in 1848, and a declaration adopted by the conference afterwards received 583 ministerial signatures. Prior to this the Personal Abstinence Society of United Presbyterian ministers, elders, and students had been formed in 1845; and all the religious bodies in Scotland have now temperance societies associated with them. It is the same in England, where the Congregationalists, Baptists, Methodists of all kinds, and Presbyterians have denominational societies. The great majority of the ministers, and nearly the whole of the students, are now abstainers. A Church of England conference, held in 1862, led to the formation of the Church of England Society, with Dr F. Close, the Dean of Carlisle, as president. In 1868 Archdeacon Sandford secured the appointment of a committee on intemperance by the Lower House of Convocation of the Province of Canterbury, and the valuable report of this committee was adopted in 1869, and widely circulated. It recommended among other things a legislative measure of local option on the ground of the excellent results arising from the exclusion of the drink traffic from numerous places in this province (upwards of 1400), by the will of the landowners. One important result of this report was the construction in 1873 of the Church of England Temperance Society on the dual basis, in order that, while total abstainers should form a distinct section, they should also be enabled to unite with non-abstainers desirous of diminishing sources of intemperance springing from social circumstances or legislation. By means of diocesan branches and a central executive much has been done to dispose the Established Church to take a more prominent part in temperance work, and the number of abstaining clergy and laity has probably increased sevenfold since 1873. The juvenile members of the society are all abstainers. The League of the Cross has been a means of promoting total abstinence among the Roman Catholics of the United Kingdom; and to Cardinal Manning's personal and official support this and other forms of temperance activity were greatly indebted.

The phrase 'Band of Hope' was first applied to juvenile societies in 1847, and under this felicitous title they have so greatly increased as to constitute a large department of the whole movement. It is estimated that upwards of two millions of young persons are embraced in Bands of Hope and other juvenile societies in the United Kingdom; and the United Kingdom Band of Hope Union—an extension of the London Band of Hope Union formed in 1855—is now one of the leading national organisations; and it initiated an effort to add a million more members to the societies in the single year 1891–92.

The abuses of friendly societies and benefit clubs by their connection with the public-house led to the formation of the Rechabite Order at Salford in 1835, and its members with those of the Sons of Temperance, and the Sons of the Phœnix (the last being almost confined to London), are numbered by many thousands. The order of Good Templars, which had long existed in America, was introduced into England by Mr Joseph Malins in 1868, and in less than seven years had so greatly spread through the United Kingdom as to number about a quarter of a million of members. A rupture in 1876, with other causes, made a large reduction in the membership, but the division has been healed, and the Good Templars throughout the world can still boast of a membership exceeding half a million. At the close of 1840 an institution was projected in London for insuring the lives of total abstainers. Seven years afterwards it was arranged to admit non-abstainers into a separate section, so that both classes would get the full benefit of their respective longevity. This office, under the name of the United Kingdom Temperance and General Provident Institution, is now one of the largest in the country, with a capital of upwards of five millions sterling.

Woman's vital relation to home life renders her deeply interested in all that concerns its welfare, and not only have women taken a leading personal part in the temperance movement, but numerous societies composed of their own sex have existed, and the British Women's Temperance Association, formed in 1876, has a network of branches in Great Britain and some branches in Ireland. It also forms a part of the Women's World's Christian Temperance Union.

The United Kingdom Alliance for the Legislative Suppression of the Liquor Traffic was formed June 1, 1853. Its first president was Sir W. C. Trevelyan, and its agencies of all kinds have for their special object the election of members to parliament favourable to its policy, in order to a measure of legislation which would enable every district to decide by a direct vote of the local electors whether the liquor traffic should exist therein or not. A Permissive Prohibitory Bill was brought into the House of Commons by the present writer in March 1864, but though repeatedly reintroduced it never obtained a second reading. In June 1880, however, a Local Option Resolution was carried by a majority of twenty-six. In 1881 and 1883 further resolutions were carried by majorities of forty-two and eighty-seven. The *Alliance News* (weekly) has the largest circulation of any temperance journal in the British Isles. The Blue Ribbon or Gospel Temperance movement occasioned extraordinary public demonstrations and large additions to the pledge.

Although some eminent medical total abstainers had ceased to prescribe alcohol as a medicine on the ground that it was needless, since other agents could be used with equal or better effect, it was not till the October of 1873 that a temperance hospital was opened in London, in which, while the visiting medical staff are authorised to give alcohol when they deem it necessary, the ordinary rule is the treatment, medical and surgical, of cases without alcohol. Buildings costing upwards of £50,000 have since been erected, and, besides a large number of out-patients, more than 7700 in-patients have been treated, the rate of mortality being a little over 6 per cent. Many very important and critical cases have been treated with complete success, and alcohol has not been administered in more than a fraction of cases (less than a quarter per cent.).

In Scotland the cause has probably a stronger hold numerically and politically than in any other section of the United Kingdom. The Scottish Temperance League and the Scottish Permissive Bill and Temperance Association have their headquarters in Glasgow, where their weekly organs, the *League Journal* and *Reformer*, are published. In Ireland the effect of the terrible years of famine, 1846–49, and the bitterness of political strife have acted prejudicially on the temperance cause, but the Presbyterian Church and the Episcopal Church of Ireland contain, especially the former, great numbers of abstainers, and the Irish Temperance League and the Irish Association for the Prevention of Intemperance direct from their headquarters in Belfast and Dublin a variety of operations. In the Roman Catholic Church several of the archbishops and other dignitaries are conducting a temperance work in connection with their ecclesiastical regulations. The League of the Cross is also active in some places. The

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Sunday closing of public-houses has proved in Ireland (1878), as in Scotland (1853) and Wales (1881), a blessing appreciated by the great body of the people. See LICENSING LAWS.

In the United States the Anti-liquor Law of the state of Maine in 1851 gave a powerful stimulus to similar legislation; and though there has been great fluctuation in this respect, prohibitory laws, both imperative and permissive, exist in various states; and in Kansas, Maine, North Dakota, and South Dakota prohibition has been incorporated with their constitutions, so that the liquor traffic cannot be licensed even by the legislatures until a popular vote has rescinded such portion of the constitutions. At the close of the civil war in 1865 efforts were made to establish a National Temperance Society and publication house in New York, and that institution, besides circulating almost countless copies of publications, has performed much admirable work in convening the International Conference of 1876 and other conventions of a national character. The Women's Crusade against Whisky, which commenced at the close of 1873, led to the abandonment of the traffic by a large number of drink-vendors, and issued in the formation of the Women's Christian Temperance Union, which has expanded into the Women's World's Christian Temperance Union. The Red Ribbon and Blue Ribbon movements originated in the New England states, and, though the excitement occasioned by them and similar outbursts of moral enthusiasm is of necessity transitory, their effects have become part of that abiding influence which philanthropic reforms cannot but ensure.

In the Dominion of Canada the Temperance Act of 1878 permits counties and cities to adopt local prohibition, and the various provincial legislatures are empowered to pass such measures as they think to be in accordance with public opinion. In India a marked revival of temperance has proceeded from the action of the Anglo-Indian Temperance Association, and the Abkhari (Excise) System is being more carefully administered. The Army Temperance Association has upwards of 17,000 European soldiers enrolled as abstainers, and publishes a monthly paper, *On Guard*. It has the highest official patronage, as its effect upon the health and *morale* of the troops is altogether beneficial. New Zealand and Australia have been taking of late years a high rank in the temperance movement; and legislation of a local option character has either been obtained, or is in course of alteration, so as to permit of the fullest expression of public opinion as to the liquor traffic. See LIQUOR LAWS.

As to the continent of Europe the retrospect is not generally pleasing. The great wave of temperance feeling which between 1845 and 1864 caused many parts of Germany and Austria to be largely converted to abstinence from spirit-drinking subsided during the political feuds and wars which followed; but the need of restrictive measures is deeply felt by some of the leading statesmen of Germany. In Switzerland, France, and Belgium the free-trade drink system has proved pregnant with social and moral evils of the gravest description. In Holland an anti-spirit society was established many years ago, and total abstinence work has been set on foot. In Belgium there are societies for promoting sobriety, but they do not insist upon abstinence from even ardent spirits. In Switzerland some societies under the name of the Blue Cross inculcate abstinence from all inebriating drinks. Russia is the victim of *vodka* (corn-spirit) and the resolve of the government not to permit the revenue from spirits to be diminished. Sweden and Norway, however, have many temperance societies and Good Templar lodges, and both these countries have shown how much may be done in the reduction of intemperance by salutary legislation. Sweden about 1830 had an unhappy repute for its drunkenness, notwithstanding its excellent system of public education; but the prohibition of distillation on private farms, and the power given to reduce or prevent the sale of liquor in rural localities have proved of so much advantage that Sweden and Norway have risen to a position hardly, if at all, equalled by any other country.

Objections and Replies.—(1) It is objected that temperance or moderation and not abstinence is the proper rule to be followed as to alcoholic drinks; to which it is replied that all temperance involves partial abstinence, the degree of the abstinence being regulated by the nature of the article concerned, and that alcoholic drinks are of such a kind as to call for entire abstinence from them, except when used medicinally. Considering temperance as signifying sobriety, it is urged that abstinence involves sobriety, and is its best security. (2) It is objected that abstinence is an example of the ascetic principle, and, therefore, not suitable for universal adoption. It is answered that there is an asceticism enjoined by religion and reason as necessary to the control of sensuous desire, and that abstinence from strong drink both illustrates and assists this control; but it is denied that it is asceticism in any unnatural sense, since it is friendly to the proper use and enjoyment of the harmless bounties of Providence. (3) It is objected that abstinence is opposed to the general experience of mankind, which ought to be accepted as a guide in such matters; the answer being that the experience of mankind is in favour of abstinence as compared with indulgence in strong drink, and that the common use of intoxicating drink in some countries is no more an argument in its favour than the prevalence of many forms of social and moral evils. (4) It is objected that countries such as the United Kingdom, where alcoholic liquor has been long and largely used, are much superior to other countries where its use is prohibited. It is answered that this fact is not to be more fairly pleaded for drinking than for drunkenness, and that the superiority referred to has its root in causes altogether different from the use of drink, and would be far more striking if such drink were not consumed by the superior races. (5) It is objected that health and strength cannot be fully maintained without the moderate use of alcohol, and that longevity is promoted by it. The answers to this objection are various: (*a*) that nations and tribes both ancient and modern, distinguished for health, strength, and longevity, have not used any alcoholic drink; (*b*) that medical testimonies in great abundance have been published in favour of total abstinence, one of which in 1847, signed by 2000 medical men, asserted that 'total and universal abstinence from intoxicating liquors of all kinds would greatly conduce to the health, the happiness, the morality, and the prosperity of the human race;' (*c*) that experiments made by Dr Parkes of Netley Hospital, and the statistics of insurance and friendly societies, show that abstinence is associated with the greatest powers of endurance, diminished sickness, and long life. In the United Kingdom Temperance and Provident Institution, out of 4856 expected claims in twenty-five years (1866–90) the actual claims were only 3423 or 70 per cent., while in the general section consisting of moderate drinkers, out of 7277 expected claims the actual were 7034 or 96 per cent., or 26 per cent. in favour of the abstainers. (6) It is objected that the combustion of alcohol in the body is a source of heat, and, therefore, that it is a true food. The

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reply is that this was Liebig's theory, but was generally abandoned after the publication of the great essay of MM. Llemand, Perrin, and Duroy, whose experiments seem to show that alcohol was ejected from the system undecomposed. This position has in its turn been disputed; but there is no doubt that at least a portion of the alcohol imbibed leaves the system undecomposed. It is not certain what becomes of the rest, but the combustion theory is opposed to the facts, that heat is reduced and not increased after alcohol is imbibed, and that none of its derivatives have been discovered. (7) It is objected that the use of intoxicating drink is sanctioned by Scripture, by Christ's example, by the miracle at Cana, by the Lord's Supper, and by St Paul's advice to Timothy. The replies are (*a*) that the Scripture commendation of wine is limited to it as a natural product, but that whenever its intoxicating quality is noted it is always referred to with condemnation as a 'mocker,' a 'serpent,' a 'transgressor' and a 'poison;' (*b*) that the example of Christ cannot be quoted on the side of strong drink unless it were known whether He used intoxicating drink, and to what extent, and that His true example is that of love to God and man, which is best exhibited by abstinence from drinks which are deceitful and destructive; (*c*) that the wine made at Cana would be innocent and not such as was condemned by the prophets, and that there is high patristic authority for assuming that the miracle consisted in hastening the natural process by which the water of the grape is converted into rich and nutritious juice; (*d*) that it is the 'fruit of the vine,' and not alcohol, which is to be used in the Lord's Supper; (*e*) that St Paul's advice was of a medical character; that Timothy's previous abstinence was not rebuked; and that St Paul has laid down the principle of the avoidance of that which is even useful in order to the preservation of our fellowmen—a principle sufficient to justify total abstinence, even if alcoholic liquors were not physically injurious but beneficial.

On the question of the prohibition of the liquor traffic there has been much controversy. Its opponents have contended that it is an invasion of personal liberty; that even when imposed by a majority it is a violation of the rights of the minority; and that all that is really required is such a magisterial and police supervision as will repress drunkenness as much as possible, and inflict deterrent penalties on offenders. To this statement various answers are returned. With regard to the violation of personal liberty the prohibitionists maintain that in one sense all law interferes with liberty. A good law interferes with the liberty to do wrong. Therefore, they say, assuming that the common sale of drink wrongs the public, a law interfering with this wrong is in accord with true liberty. They hold that individual profit must be subservient to the public welfare, *Salus populi suprema lex*. If hardship is alleged as affecting the buyer, the statement of J. S. Mill is quoted, who declared that every artificial augmentation of the price of an article is prohibition to the more or less poor; yet there is hardly any government which does not in some way or other legislate so that the price of intoxicants is increased. As to the possibility of extirpating intemperance by means of strict regulation as to the sale of drink, the prohibitionists affirm that the existing system has been tried for hundreds of years, and often under the most favourable circumstances for its success, and that yet the licensing system, as judged by its fruits, is confessed to be a melancholy failure.

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aspect are *The Use and Abuse of Alcoholic Liquors*, aft
wards republished as *The Physiology of Temperance a*
Total Abstinence (Prize Essay), by Dr W. B. Carpent
Alcohol, its Place and Power, by Professor Miller; t
Cantor Lectures on Alcohol, by Dr B. W. Richards
On biblical criticism and the Bible wine question are t
Temperance Bible Commentary, by Dr F. R. Lees a
Dr Dawson Burns; the *Practical Bible Temperan*
Commentary, by Rev. A. Stewart; *Scripture Testimon*
by Rev. Dr W. Ritchie; *Wines Scriptural and Eccle*
astical, by Dr N. Kerr. The only volume on the oth
side is *The Wines of the Bible*, by Rev. A. M. Wilso
On temperance economics is *Our National Resources a*
how they are wasted, by W. Hoyle; of history and bi
graphy there are *Handbook of Temperance History*, edit
by Robert Rae; *Temperance History*, by Dr Daws
Burns; *Temperance Workers and the Temperance Mov*
ment, by P. T. Winskill. For young persons there a
Morning Dew Drops, by Mrs Balfour, the *Lesson Book*,
Dr B. W. Richardson, and the *Temperance Primer*, by
J. J. Ridge. On temperance legislation are the House
Commons' Select Committee's *Report*, 1834; *The Arg*
ment for Prohibition (Prize Essay), by Dr Lees, and
Lees's *Condensed Argument* and *Replies to One Hundr*
Objections; *Reports* of the Committees on Intemperan
appointed by the Convocations of Canterbury and Yor
Local Option, by W. S. Caine, W. Hoyle, and Dr Daws
Burns. Among a multitude of American works, Senat
H. W. Blair's *History of the Temperance Reform*, and *Th*
Liquor Problem in all Ages, by the Rev. Dr Dani
Dorchester, are of special value. Reports of variou
temperance conventions and congresses contain man
valuable papers on all branches of the question. See al
the articles ALCOHOLISM, INEBRIATES, LICENSING LAW
LIQUOR LAWS, and those on eminent advocates of ten
perance, such as Fulton, Mathew, George Cruikshan
and Archdeacon Farrar.

Temperature is the thermal condition of
body which determines the interchange of hea
between it and other bodies. Our first ideas
temperature are derived from our sensations of h
and cold. As explained under Heat (q.v.), th
effect of adding heat to a body is to make it hotte
unless it is at its melting or boiling point. Th
rise of temperature is accompanied by volun
changes, on which all our practical methods
measuring temperature depend (see THERMOMETER
Now, although the idea of temperature is familia
enough, its true significance is difficult to unde
stand. So-called thermometric measurements
temperature are not measurements in the stri
scientific sense of the term. They are simpl
the comparison of certain other effects whic
accompany change of temperature in speci
bodies. A scientific measure of temperature shoul
be independent of any particular substance, an
should depend solely upon the fundamental pr
perties of heat itself. This absolute measure
temperature was first given by Lord Kelvi
(Sir W. Thomson), who based his system
Carnot's thermodynamic cycle (see THERM
DYNAMICS). The kinetic theory of Gases (q.v
has given us a definition of temperature in tern
of the kinetic energies of the molecules. Th
assumption is that the molecules are free fro
molecular forces; the conclusion is in agreemer
with Boyle's, Gay-Lussac's, and Charles's law
As no gas obeys these laws rigorously, the i
ference is that intermolecular actions come in
play, so that only part of the temperature can

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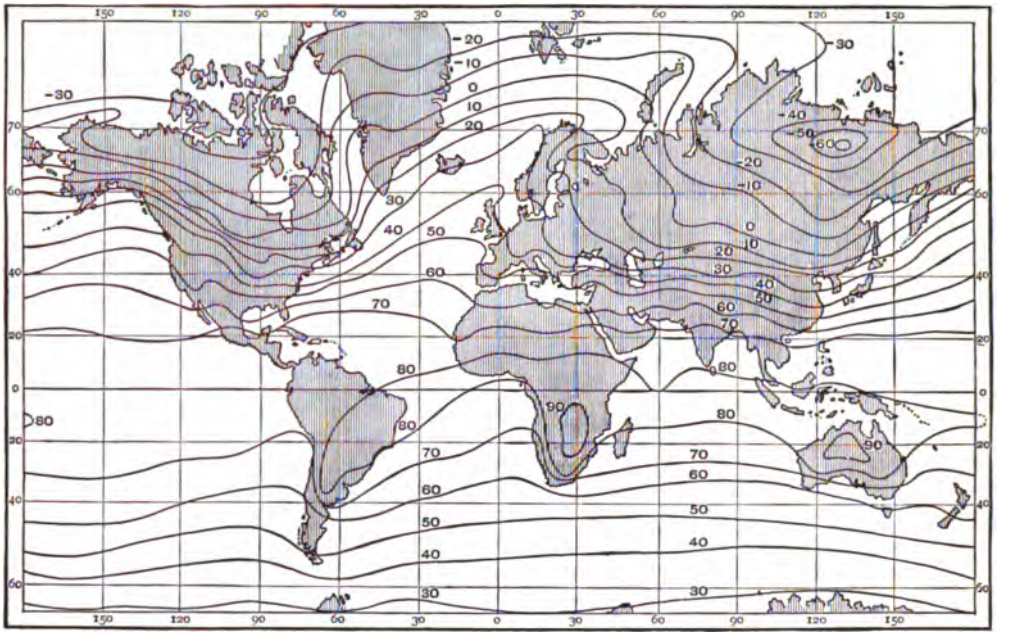
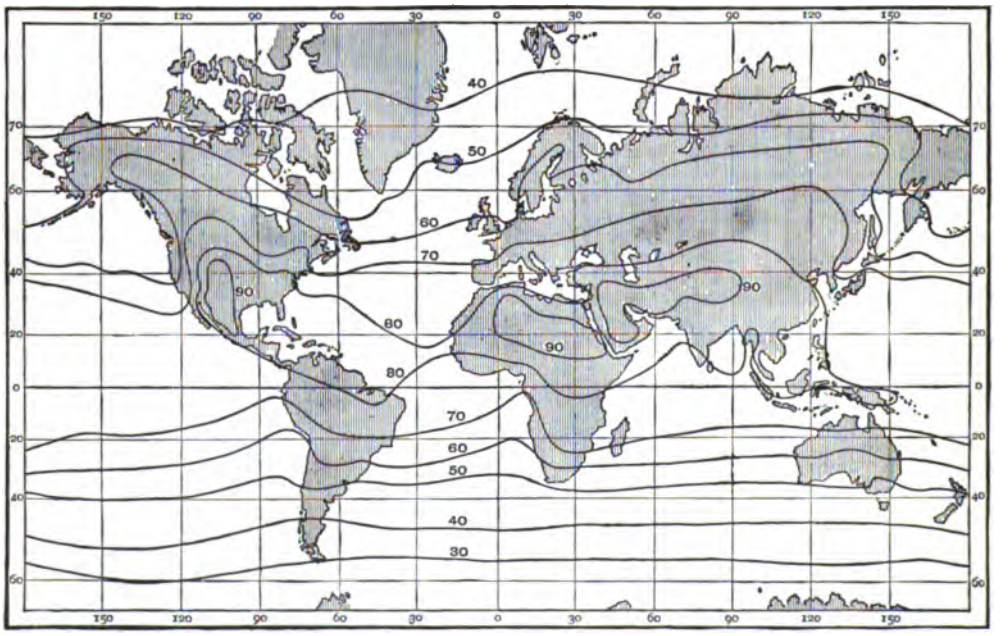
expressed in terms of the kinetic energies of the molecules. The same is true, but in a much greater degree, for liquids and solids, for which as yet no kinetic theory has been formulated.

From experiments made by Kelvin and Joule, the absolute zero of temperature was found to be 274 centigrade degrees below the freezing-point of water, or – 461° on the Fahrenheit scale. This



Isothermal Lines showing the Mean Temperature of the Globe for January.



Isothermal Lines showing the Mean Temperature of the Globe for July.

agrees almost exactly with the value deduced from the kinetic theory of gases. From our present standpoint, therefore, we cannot expect to get a colder temperature. The coldest natural temperature hitherto registered on the earth's surface is – 88·8° F., which was observed in January 1886 at Verkhoyansk in Siberia (67° 34′ N. lat. and 133° 51′ E. long.). Olszewski has, in his experiments on the liquefaction of the gases, measured temperatures as low as – 373° F. by means of a hydrogen thermometer. Guesses have been made from time to time as to the temperature of space, Pouillet,

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for example, putting it at – 238° F. and Fourier at – 58°. From our present physical outlook, however, the phrase 'temperature of space' is meaningless. Only where matter is can a true temperature exist. A thermometer placed in space will receive radiations from all sides, and the temperature indicated will depend on the power it has to transform these radiations into the irregular motions which constitute heat in a body. An ideal thermometer, transparent to all radiations, and capable only of receiving heat by contact with other bodies, would remain unaffected if isolated in space.

In meteorology the distribution of atmospheric temperature is one of the most important problems calling for discussion. The mean annual temperature over the whole surface of land and sea is perhaps about 45° F. At Verkhoyansk the lowest monthly mean averages – 61·2° F. The highest monthly mean averaged over several years may be set down at fully 110° F., and is experienced in the north-western parts of India, where the thermometer in free shaded air not unfrequently touches 125° F. Loomis in his *Meteorology* gives 133° F. as the highest authentic reading, made in the Great Desert of Africa. Exceptionally high readings made by travellers in Arabian and African deserts must, however, be accepted with great caution. It is indeed no easy matter satisfactorily to measure air temperatures, especially when they are high. It is not enough to shade the thermometer from direct sun rays. It must be shaded as effectually from reflected radiations from earth and sky; and at the same time the air must be free and not confined. To facilitate the study of the distribution of temperature at the earth's surface, it is usual to construct charts of *isotherms*. These are lines, each of which is drawn through all places having the same mean monthly, mean seasonal, or mean annual temperature. The most recent and complete charts of this character are those prepared and published by Dr Buchan in his *Challenger* Report on Air and Ocean Temperatures (1890). Two of these charts are reproduced here on a diminished scale. They show the mean temperature (Fahrenheit) of the globe for January and July, the typical winter and summer or summer and winter months for all regions on the earth's surface. A glance will indicate how greatly the distribution of land and sea influences the distribution of temperature. In January the great land-areas in the northern hemisphere are much colder than the ocean-areas at the same latitude; in July this relation is reversed. For a full discussion of the facts embodied in these and the charts for the other months of the year, as well as of the related facts referring to barometer pressure, rainfall, humidity, diurnal changes, &c., see the elaborate Report mentioned above. A concise abstract, given by Dr Buchan himself, will be found in the *Proceedings of the Royal Geographical Society* (March 1891).

The periodic changes of atmospheric temperature are due to the sun. The earth itself has, however, a distinct temperature, which increases at the rate of 1° F. for every 50 or 60 feet of descent through the few miles of crust accessible to us. Upon this real earth temperature the mean annual temperature of the air must to a large extent depend. According to Professor Langley, the surface of the moon with its long 'day' of a fortnight never gets hotter than the freezing-point of water, however brightly it may be shone upon. This shows that the moon is intrinsically much cooler than the earth. See also EARTH, CLIMATE, SEASONS, SEA.

TEMPERATURE OF THE BODY.—In the article ANIMAL HEAT the general principles of the subject have been discussed; it remains to consider more in detail the variations of temperature in health and disease. The temperature differs in different parts of the body; it is lower and more variable on the surface of the skin than in internal organs or closed cavities. Observations are usually made with the thermometer held either in the armpit or under the tongue; the latter gives results less than half a degree (F.) higher than the former. In the healthy adult in temperate climates the average temperature in the armpit is about 98° F., but undergoes periodical daily variations of nearly a degree in each direction from the mean, being lowest between 2 and 6 A.M., highest between 5 and 8 P.M. A slight rise takes place during the digestion of each meal. In the tropics the temperature is a little higher (less than 1°); it is less diminished in very cold climates. It is slightly higher in childhood, and slightly lower in old age. A persistent elevation or depression of the temperature of more than a degree beyond the limits thus indicated is good evidence that there is some departure from health. In some chronic diseases, especially chronic Bright's disease, diabetes, and myxœdema, the temperature is persistently lowered; in the last it may be as low as 95°. But elevation of temperature is of much more common occurrence and much more important. It occurs in connection with all acute inflammations and all febrile diseases; and careful observations of its degree and its changes from day to day or hour to hour afford one of the most reliable guides to the diagnosis of many diseases, and the estimation of their severity and probable result. Generally speaking, a temperature of 99·5°—101·5° F. may be regarded as slightly febrile; up to 103·5° F. as moderately febrile; up to 106° F. as highly febrile; and above that as hyperpyretic, and, with rare exceptions, as indicative of great danger.

See Wunderlich's *Medical Thermometry*, and Aitken's *Science and Practice of Medicine*.

Tempering. See STEEL, Vol. IX. p. 710.

Templars, a famous military order, which, like the Hospitallers and the Teutonic Knights, owed its origin to the Crusades. In the year 1119 two comrades of Godfrey de Bouillon, Hugues de Payen and Geoffroi de Saint-Adhémar, bound themselves and seven other French knights to guard pilgrims to the holy places from the attacks of the Saracens, taking before the patriarch of Jerusalem solemn vows of chastity, poverty, and obedience. King Baldwin II. gave them for quarters part of his palace, which was built on the site of the Temple of Solomon close to the church of the Holy Sepulchre. Hence they took their name as Templars (*pauperes commilitones Christi templique Salomonici*), and the houses of the order, as at Paris and London, that of the Temple. At the Council of Troyes (1128) Bernard of Clairvaux drew up its rule in seventy-two statutes, substantially the groundwork of the statutes as finally revised in the middle of the 13th century. The order at first consisted of knights alone, but later its members were grouped as knights, all of noble birth, chaplains, and men-at-arms (*fratres servientes*), besides mercenaries, retainers, and craftsmen affiliated, and enjoying its protection. The knights took the vows for life or for a certain period, and they alone wore the white linen mantle, with the eight-pointed red cross on the left shoulder (granted by Pope Eugenius III.), and white linen girdle; black or brown garments were worn by all others. The seal of the order showed the Temple, later two riders—a Templar and a helpless pilgrim—on one horse. The discipline of the order was austere, excluding all needless luxury or display in food, dress, or armour, and all worldly pleasures were forbidden—hawking and hunting all animals, with

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the characteristic exception of the lion. Married brethren were admitted, but no woman might enter the order, and all brethren were enjoined to shun the kiss of woman, even of mother or sister. The beard was worn, the hair cut short, and all slept alone in shirt and breeches, with a light constantly burning. At the head of the whole order stood the Grand-master; under him Masters, Grand Priors, Commanders, or Preceptors ruled the various provinces of Jerusalem, Tripoli, Antioch and Cyprus, Portugal, Castile and Leon, Aragon, France and Auvergne, Aquitaine and Poitou, Provence, England, Germany, Italy (Middle and Upper), Apulia and Sicily. Second in command to the Grand-master stood the Seneschal, his deputy; next the Marshal, whose business, moreover, was to provide arms, horses, and all the material of war. Visitors-general conveyed the commands of the Grand-master and convent or chapter of Jerusalem to the various provinces, exercised discipline, and settled disputes. The Prior or Preceptor of the kingdom of Jerusalem, also styled 'Grand-preceptor of the Temple,' was also general treasurer of the order. The Drapier had general charge of the clothing; the Standard-bearer (*balcanifer*) bore the glorious *bausėant* or war-banner (half black and half white, with the legend, *Non nobis, non nobis, Domine, sed nomini tuo da gloriam*) to the field; the Turcopilar commanded the Turcopoles, a body of light horse, natives of Syria and Palestine, in the pay of the order; the Guardian of the Chapel (*custos capellæ*) had charge of the portable chapel and the appurtenances of the altar, always carried into the field. The Templars were, by a papal bull in 1172, rendered independent of the authority of the bishops, owning allegiance to the pope alone, the immediate bishop of the entire order; and, moreover, they were allowed to have chaplains within their own ranks to whom they might confess, to erect oratories for divine worship within their bounds, and to enjoy exemption from all taxes and tithes, and from interdict. Their houses enjoyed right of sanctuary, and they often preserved the treasure of kings and nobles.

The Templars, at once knights and monks, realised the two dearest of mediæval ideals, and men of the highest courage and purest devotion flocked into their ranks, bringing with them their wealth to fill their coffers. Already by 1260 the order is said to have numbered 20,000 knights, and these perhaps the finest fighting men the world has seen. Never in the history of the world did men fling away their lives more gloriously for a hopeless cause; never did a Templar play the coward in the hour of danger, nor, when all hope was lost, barter his soul to a Moslem conqueror in return for his life. Charges of pride, of immorality and impieties, of secret heresies, and even of betraying Frederic II. to the infidel (1229) and St Louis to the Soldan of Egypt (1250) were yet to be hurled against the order; never, from the beginning to the end of their two centuries of history, was a Templar charged with cowardice before the enemy. It was their proud boast that 20,000 of their number perished for the cause in Palestine; of their twenty-two Grand-masters seven died on the field of battle, five of their wounds, one of voluntary starvation a prisoner in the hands of Saladin. The most famous successors of Hugues de Payen (died 1136) were Bernard de Tremelai, who fell at Ascalon in 1153; Eudes de Saint-Amand (died 1179), who won a glorious victory over Saladin at Ascalon (1177), only to fall next year into the sultan's hands after a disastrous battle; Gerard de Riderfort, who suffered a terrible defeat near Nazareth in 1187, a second at Hittin two months later, and died in battle under the walls of Acre in 1189; Robert de Sable, who aided Richard Cœur de Lion to gain a glorious victory in the plain of Arsouf (1191), and bought from him the island of Cyprus, which was soon transferred to Guy de Lusignan, whereupon Acre became the seat of the order, the famous stronghold of Pilgrim's Castle being built, whose stupendous ruins exist to this day; Peter de Montaigu, whose courage helped to take Damietta in 1219; Hermann de Perigord, who rebuilt the fortress of Safed; Guillaume de Sonnac, slain beside St Louis at the Nile in 1250; Thomas Bérard, an Englishman, under whom Safed was lost in 1266, Jaffa and Antioch in 1268; and Guillaume de Beaujeu, who lost Tripoli in 1290, and fell in the bloody capture of Acre in 1291. The remnant of the Templars sailed to Cyprus, and the latest dying gleams of the order's vigour in the East were the rash attempts to capture Alexandria (1300), and to establish a settlement at Tortosa (1300–2) under the last and most ill-fated of its grand-masters.

The Templars had failed in their work; their usefulness was past; the order had now only to sink into extinction in one of the darkest tragedies of history. Their wealth and pride had sowed a harvest of fear and hatred; their loyalty to the pope and their exceptional privileges had long since aroused the jealousy of the bishops; their bitter quarrels with the Hospitallers, which blazed into open warfare in Palestine in 1243, had shocked the moral sense of Christendom; and the exclusiveness and secrecy with which all their affairs were conducted opened a door for all manner of sinister suspicions among the populace. Philip the Fair of France was a king who covered with a thin veneer of piety a character of complete unscrupulousness; he had succeeded in placing Clement V., a miserable creature of his own, upon the papal throne (1305), and in his minister Guillaume de Nogaret and the officers of the Inquisition he found servants of character unscrupulous as his own. His unfortunate Flemish wars had brought him into desperate financial difficulties, and his treasury was now completely exhausted in spite of extortionate taxation, a shameful debasement of the currency, and the merciless plunder of the Jews and the Lombard bankers. In the wealth of the Templars he saw a tempting prize, and the train of treachery was soon complete. Doubtless their numbers and even their wealth are enormously exaggerated by historians; Schottmüller assumes that in France alone there were 15,000 brethren, and over 20,000 in the entire order; Mr Lea thinks that at the end there may have been as many as 1500 knights. The Grand-master, Jacques de Molay, was summoned from Cyprus by the pope in 1306; he came, bringing with him the treasure of the order, and awaited his fate in France. On the 13th October 1307, which Döllinger in one of his latest lectures calls an outstanding *dies nefastus* in human history, the Grand-master and 140 Templars were seized at the Temple and flung into prison. Two degraded Templars supplied some of the charges the king required; tortures, infamous beyond the infamies of the Inquisition, provided the remainder. A habitual denial of Christ, spitting upon the cross, the worship of hideous images, travesty of the holy communion and of the sacrifice of the mass, sorceries, unnatural lusts, *oscula inhonesta* and other indecencies—such were the confessions suggested to and wrung from men racked by the agonies of inhuman tortures to which as many as thirty-six knights succumbed in Paris alone. In August 1308 Clement sent throughout Christendom the 127 articles of interrogation for the accused, and evidence in detail self-contradictory beyond all parallel was quickly accumulated. In the 225 witnesses sent to the papal commission (1310–11) from various parts of France the depositions, as Mr Lea

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points out, occur most suspiciously in groups of identity according to the bishops from whose preliminary tribunals they had come. Philip held a so-called national assembly at Tours (May 1308) which obsequiously expressed its approval of the condemnation. The pope now took the formal responsibility upon himself by personally examining seventy-two Templars brought before him, when those who had already confessed under torture confirmed their confessions, knowing well that the penalty of retractation was burning forthwith as a relapsed heretic. The pope contended that the fate of the order as an institution must be submitted to a general council. Meantime, to the public commission appointed to examine into the charges at Paris, to give the order an opportunity of being heard in its defence, and to report there came (March 1310) as many as 546 Templars who offered to defend the order against all the charges—blunt, unlearned soldiers, deprived of their chiefs, and weak with torture, long imprisonment, cold and hunger. Four of these were at length commissioned to be present at the investigation on behalf of the order, when suddenly the commission was startled by the news that the provincial council of Sens was about to sentence without further hearing those Templars who had offered to defend the order as relapsed heretics in regard to their former confessions. On 12th May 1310 fifty-four knights were slowly burned to death, refusing in the midst of the most awful agonies to perjure themselves by false confessions. The commission at once suspended its sittings, but at length, after many delays, on June 5, 1311, transmitted its report to Clement to help the General Council in its deliberations. The closing act in this dreary and tangled drama of papal duplicity was Clement's failure to gain over the Council at Vienne, and the suppression of the order without formal condemnation, by the bull *Vox in excelso* (March 22, 1312). The bull *Ad providam* (May 2) laid it under perpetual inhibition, and transferred its property to the Hospital of St John of Jerusalem. The persons of the Templars were handed over to the provincial councils, with the exception of the chiefs of the order, who were reserved to the jurisdiction of the holy see—a vain hope for which they had left their inferior brethren to their fate. At length, on March 19, 1314, Jacques de Molay and the gray-haired Geoffroy de Charney, Master of Normandy, were brought from prison to receive judgment, when, to the dismay of the churchmen and the astonishment of all, they rose and solemnly declared their innocence and the blamelessness of the order. That same day, on the Isle des Juifs in the Seine, they were slowly roasted to death, declaring with their last breath that the confession formerly wrung from them by torture was untrue. A strange tradition asserts that from the stake the Grand-master summoned both the pope and the king to meet him at the bar of Almighty God within a year, and history tells us that within the year both went to their account.

In England the trials were conducted with much less inhumanity, and it was only direct pressure from the pope that persuaded the king to permit torture to be applied. The charges for the most part failed to be established, and most of the prisoners were granted penances and permitted to escape with a formal abjuration, while a fair provision was made for their support. The last Master of the Temple in England, William de la More, died a prisoner in the Tower, to the last maintaining the innocence of the order. The memory of the various preceptories and possessions in England, Scotland, and Ireland survives in place-names; the round Temple Church in London, consecrated in 1185, was restored by the Benchers of the Inner and Middle Temple (1839–42) at a cost of £70,000. In Spain, Portugal, and Germany the order was found innocent; almost everywhere in Italy, save in the case of six at Florence, the charges broke down. Everywhere the larger part of their property was given to the Hospitallers, and even in France the king was in great part forced by public opinion to forego his prey.

The literature almost forms a library; here we can name only Raynouard, *Monumens hist. rel. à la Condemnation des Chevaliers du Temple* (1813); Wilcke, *Geschichte des Tempelherrenorden* (3 vols. Leip. 1826–35; new ed. 1860); Michelet, *Histoire de France* (vol. iii.) and *Procès des Templiers* (2 vols. 1841–51); Havemann, *Geschichte des Ausgangs des Tempelherrenordens* (Stutt. 1846); Loiseleur, *La doctrine secrète des Templiers* (1872), an ingenious but unreliable work; Merzdorf, *Geheimstatuten des Ordens der Tempelherren* (Halle, 1877), a work not to be trusted; H. de Curzon, *La règle du Temple* (1886), the most reliable book on this part of the subject; Konrad Schottmüller, *Der Untergang des Templer-Ordens* (2 vols. Berlin, 1887), the most thorough-going of later apologies, and perhaps the best work on the subject; Hans Prutz, *Entwicklung und Untergang des Tempelherrenordens* (Berlin, 1888), the most learned of more recent attacks upon the order, but marred by laborious attempts to construct a preposterous case of Catharist heresy. Ranke (*Weltgeschichte*, 8 Theil, 1887) follows Hammer-Purgstall (*Die Schuld der Templer*, 1855) in thinking that the order had fallen away from Christian faith, and adopted a body of secret and heretical doctrine, which had originated in their contact with Islam in the East; but, as Döllinger points out (*Akademische Vorträge*, vol. iii., Munich, 1891), he is hesitating and cautious, and makes many reservations, while he was evidently not acquainted with the most recent works on the subject. In English there are Addison's excellent *History of the Knights Templars, the Temple Church, and the Temple* (2d ed. 1842); Haye's *Persecution of the Knights Templars* (Edin. 1865); Froude's three interesting but superficial lectures (*Good Words*, 1886; reprinted in *Spanish Story of the Armada*, &c., 1892); and especially Henry C. Lea's admirable *History of the Inquisition* (vol. iii. 1888). *The Templars' Trials* (1888), by J. Shallow, contributes little to the question.

Temple (Lat. *templum*; cf. Gr. *temenos*, from *temnein*, 'to cut off,' and so 'set apart'), a place or building dedicated to the worship of a god or gods, and amongst most peoples rendered impressive by the noblest architecture and richest adornment available. The history of Greek temple-building is largely the history of Greek Architecture, and is discussed at that head. See also the articles on OLYMPIA, EPHESUS, ATHENS, &c. For other than Greek temples, see ROMAN ARCHITECTURE, PANTHEON, ROME; INDIA (*Architecture*), PAGODA, ELEPHANTA, ELLORA; EGYPT (Vol. IV. pp. 235, 236), EDFU, ABU-SIMBEL, PHILÆ; CHINA (Vol. III. p. 187), PEKING; BAALBEK, PALMYRA, BORO BUDOR, TEOCALLI, &c., where illustrations of many types of temple will be found.

The Temple of Jerusalem has quite exceptional interest for us. When David brought the ark of Jehovah to Jerusalem, he pitched a tent for it within his citadel, and offered sacrifices before it. The *Temple of Solomon* replaced this temporary sanctuary, and in like manner consisted essentially of a chamber to contain the ark, and a court in front for the worshippers and their sacrifices. This was the common type of ancient temples, especially in Phœnicia, save that in them the place of the ark was taken by a sacred cippus ('pillar') or image. It was therefore natural that the Hebrew king, whose own subjects were unskilled in architecture, should send to Hiram, the great temple-building king of Tyre, for architects and workmen, and that the plan and decoration of the new sanctuary closely followed Phœnician models. The 'house,' as was often the case in greater temples, consisted of two divisions—the adytum, 'oracle,' or chamber of the

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ark, and an antechamber, in which stood the table of showbread, ten candlesticks of gold, and other articles of sacred furniture. The former was a cube of 20 cubits, or 30 feet; the antechamber had the same breadth, but was 40 cubits long and 20 high. In front of this again was a portico 10 cubits deep. Both the oracle and the outer chamber had folding-doors; the inner walls were lined with cedar and richly overlaid with gold, the motive of the ornament being the Phœnician cherub and palm-tree. Two cherubs with outstretched wings stood in the adytum and formed a sort of baldachin over the ark. The roof was probably high-pitched, and supported on wooden pillars (1 Kings, x. 12). There were windows, either in the gables or in a sort of clerestory that rose above the triple tier of small chambers by which the main building was encased on all sides except the front. Of the façade we have no account, but perhaps we may conclude from the description of Ezekiel's ideal temple that the portico was adorned with slender turrets like those shown on numismatic representations of the temple at Paphos. In front of the porch stood two pillars of bronze, 18 cubits high, with lotus-shaped capitals. Similar free-standing pillars are seen on coins in front of the temple of Paphos, and the same feature reappears in other eastern temples. We read of an inner and an outer court; the former was the proper court of the temple, the latter was the court of the palace as well as of the sanctuary, which thus presented itself as essentially the royal chapel. Later kings of Judah made considerable changes in and about the temple; thus Jer. xxxvi. 10 speaks of a 'new gate' in the 'higher court,' which is perhaps the same with the 'new court' of 2 Chron. xx. 5. Solomon's temple was burned by Nebuzaradan, Nebuchadnezzar's general, in the year 588 B.C.

The Temple of Zerubbabel, completed in 516 B.C., after long efforts and much discouragement, was designed, according to Ezra, vi. 3, to exceed the old in magnitude. But whether the dimensions there specified (a breadth and height of 60 cubits) were actually attained seems doubtful in view of Hag. ii. 3. In this temple, as in that of Herod, the folding-doors of the adytum were replaced by a veil or curtain; the altar in front of the house was a great platform of stone; the furniture was inferior in splendour; the ark was wanting; and there was only one golden candlestick. In the course of time a multitude of subordinate buildings grew up round the 'house,' in accordance with the requirements of a more elaborate priestly ritual. The circuit was fortified; and the approach to it from the higher ground on the north-west was further covered by a citadel, called the Acra or Baris. At the time of Pompey's siege (63 B.C.) the temple complex was an almost impregnable stronghold, strengthened on its weakest side (to the north) by great towers and a deep ditch.

The Temple of Herod, commenced by Herod the Great in his eighteenth year (about January 19 B.C.), was new from the foundations and, with its outer courts and surrounding colonnades, covered double the old area. To form so large a level space on the hill-top of Zion enormous substructures were necessary, except along the east side, where the colonnade rested on old works ascribed to Solomon, and was accordingly known as Solomon's porch (John, x. 23; Acts, iii. 11; v. 12). According to Josephus, the southern and eastern colonnades were each a stadium, or 600 feet, in length, and the whole circuit of the plateau, including the citadel of Antonia, which stood at the north-west corner, and replaced the Baris, was six stadia. The citadel, which was occupied by the garrison, was of course not holy ground; but neither was the adjacent temple enclosure, connected with the Antonia by a flight of stairs, and usually called the outer court, or, by modern writers, the Court of the Gentiles. Besides its porticos or colonnades, the outer court had various buildings connected with the priestly service, and also contained, near one of the western entrances, the council chamber of the Sanhedrim. It was here too that the money-changers and dealers in articles required for sacrifice had their tables and stalls. Towards the centre of this temple enclosure was a quadrangular platform, lying east and west—the 'inner court.' This, according to Josephus, was surrounded on all sides by walls, of which the external height was 40 cubits, and the internal 25 cubits, its floor being thus 15 cubits above the level of the outer court. On three sides it was surrounded by flights of steps; and the whole was cut off from the rest of the enclosure by a stone balustrade, 3 cubits high, with pillars at regular intervals bearing Greek and Latin inscriptions forbidding the alien to pass on pain of death. The eastern wall of this inner court was pierced by one gate; the north and south walls had four each; the west wall was unbroken. The eastern gate was exceptionally splendid, being made of 'Corinthian brass' and not merely overlaid like the others with silver and gold. The eastern and smaller portion of the inner court was walled off from the rest and known as the Court of the Women. The larger western portion, the Court of the Men (of Israel), stood on a somewhat higher level, and, besides having gates of its own on the north and south, was entered from the Court of the Women by the large 'Nicanor' gate; either this or the gate of Corinthian brass already mentioned was the 'Beautiful Gate' of Acts, iii. 2. The inner court was colonnaded all round, and there were chambers or 'treasuries' against the inner wall. In the middle of the Court of the Men stood the temple proper, again on a higher level, reached by a flight of twelve steps. Its ground plan was the same as that of Solomon's temple, but its height, obviously with a view to harmony with the larger surroundings, was greater (60 cubits?), and the porch was 100 cubits broad and 100 cubits high. The 'holy place' (as it is usually called) contained the candlestick with seven lamps, the table of showbread, and the altar of incense; the 'holy of holies,' separated by an exceedingly thick and heavy veil, was empty. In front of the fane was the stone altar, 50 cubits square and 15 high, according to Josephus. Round temple and altar ran a stone fence, about a cubit in height, which marked off the so-called Court of the Priests from the area accessible to the laity. The fane proper was completed eighteen months after its commencement, but the 'building' of Herod's temple in the larger sense of the word was still in progress when our Lord began His ministry (John, ii. 20) and was not in fact finished till the procuratorship of Albinus (62–64 A.D.). The whole was burned to the ground when Jerusalem was taken by Titus (August 70 A.D.).

Those scholars who accept Josephus' measurements (he wrote from memory and some years after the temple had been destroyed) necessarily hold that the temple enclosure occupied only a portion of the present Haram area, which measures about 1500 feet from north to south, with a breadth of some 922 feet. Others, however, regard Josephus' figures as much too small, and, broadly speaking, consider that the whole of the Haram area was levelled up by Herod. According to the first view, the so-called Sakhra or 'Dome of the Rock' fell outside the temple area, but the supporters of the second view generally accept the tradition according to which the Sakhra marks the site of the holy of holies. It can be shown, however, that this tradition does not go further back

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than the reign of Abd al-Melik (691 A.D.). It is agreed on all hands that the south-west angle of the Haram area is the south-west angle of Herod's temple, and that the line of the west wall of that area is the west wall of the temple, or of the temple and Antonia. Two of the most important data for the modern topographer seem to be the arch known as Robinson's arch at the south-west corner, and that known as Wilson's arch, 600 feet to the north of it; they seem to correspond to the two more southerly gates on the west mentioned by Josephus, which led respectively to the southern and northern porticos of the temple enclosure. The best judges, such as Petrie, believe that nothing older than Herod is found in the extant western walls and substructures. Of other supposed data it is to be observed that, if Josephus' measurements are correct, the arch substructures on the south, known as 'Solomon's Stables,' are post-Herodian; on this view they are to be identified with the substructures of Justinian's church mentioned by Procopius. The so-called 'Golden Gate' in the eastern wall of the Haram area is certainly post-Herodian.

See De Vogüé, *Le Temple de Jérusalem* (1864); Fergusson, *The Temples of the Jews* (1878), Thrupp, *Antient Jerusalem* (1855); the publications of the Palestine Exploration Fund; and the important art. 'Temple' by Robertson Smith in the *Ency. Brit.*; also Schürer, art. 'Temple' in Riehm's *Bibl. Wörterbuch*. See also the article JERUSALEM, Vol. VI. p. 308.

Temple. See INNS OF COURT, TEMPLARS.

Temple, FREDERICK, Bishop of London, was born 30th November 1821, the son of an officer, in Leukas, one of the Ionian Islands. He was educated at Tiverton and at Balliol College, Oxford, where in 1842 he graduated double-first, and was subsequently fellow and tutor of his college. Successively principal of Kneller Hall Training College, inspector of schools, and headmaster of Rugby, he became conspicuous in the theological world in 1860 as author of the first of the *Essays and Reviews* (q.v.). In 1868–70 he supported the disestablishment of the Irish Church, and was in 1869 consecrated Bishop of Exeter—a Broad Church successor to the High Church Dr Phillpotts (q.v.)—in spite of strong clerical opposition. He proved an admirable administrator, and in 1885 was promoted to the see of London. His *Sermons preached in Rugby Chapel* appeared in 1861; he was Bampton lecturer in 1884, and has taken an active part in temperance reform.

Temple, RICHARD GRENVILLE, EARL (1711–79), elder brother of George Grenville (q.v.), is mainly known as having from 1752 to 1761 held office under the elder Pitt, who had married his sister; as having bitterly opposed Bute; and as having broken with Pitt (Chatham) on the question of the Stamp Act in 1766, soon after which time he ceased to take any prominent part in public affairs.

Temple, SIR WILLIAM, diplomatist and essay-writer, was the eldest son of Sir John Temple, Master of the Rolls in Ireland, and of Mary Hammond, sister of the well-known royalist divine, and was born at Blackfriars in London in 1628. He studied two years at Emmanuel College, Cambridge, where he had Cudworth for his tutor, but at nineteen went abroad on his travels, falling in love with Dorothy Osborne (1627–95) in the Isle of Wight on his way to France. His own father sat for Chichester in the Long Parliament, while Sir Peter Osborne was governor of Guernsey and a strong royalist, and naturally disliked the match. But the lovers were constant in their affection, and their seven years of separation gave opportunity for those delightful letters of Dorothy's, the charm of which defies the touch of time. Temple travelled in France, Spain, and Holland, married Dorothy in January 1655, lived some years in studious retirement in Ireland, and was returned for Carlow to the convention parliament at Dublin in 1660. Three years later he settled finally in England; in 1665 was sent on a secret mission to the Bishop of Münster; and on his return was created a baronet and appointed resident at the court of Brussels. His most important diplomatic success was the famous treaty of 1668, known as the Triple Alliance, by which England, Holland, and Sweden united to curb the ambitious schemes of France. This negotiation was accomplished in five days, in conjunction with the great Dutch statesman De Witt, but was rendered vain through the treachery of Charles II. in the secret Treaty of Dover (1670). Temple also took part in the congress of Aix-la-Chapelle (May 1668), and soon after was appointed ambassador at the Hague. He had his share in the long congress at Nimeguen, and was recalled in June 1671 a few months before the beginning of the shameful war between England and Holland. By the Treaty of Westminster (February 1674) Temple ended the war, and, after declining both the embassy to Spain and the secretaryship of state, went again ambassador to Holland. In 1677 he assisted in bringing about the marriage of the Prince of Orange with the Princess Mary. Charles II. in vain offered him again the secretaryship of state; and in the confusion of the Popish Plot accepted his proposed constitutional remedy of a reformed privy-council of thirty persons, by whose deliberations to be guided in all public affairs. As might have been foreseen, so numerous a council, under such an unprincipled sovereign as Charles II., and in times of such fierce faction and widespread corruption, proved an utter failure. For some little time an inner council of four—Temple, Halifax, Essex, and Sunderland—attempted to control public business, but Temple, who was too honest for his fellows, soon felt himself being ousted even from this, and retired to his villa at Sheen, where he lived till 1686, thereafter at Moor Park in Surrey.

When the Revolution placed William III. on the throne Temple was again offered the secretaryship of state, but again refused. His son, the sole survivor of seven children, was made secretary for war, but a week after drowned himself in the Thames, his mind being unable to bear the burden of responsibility. The remainder of his days Temple gave to letters and to gardening. The king occasionally consulted him, and during great part of this period he had with him as his secretary young Jonathan Swift, who regarded his stately self-complacent patron with more fear than affection, but ultimately became his literary executor. Temple died at Moor Park, January 27, 1699, and was buried beside his wife in Westminster Abbey, his heart beneath the sun-dial at Moor Park.

As a writer Temple is now known chiefly by his historical *Memoirs* (1691, 1709) and his *Miscellanea* (1679, 1692), a collection of essays on various subjects—government, trade, gardening, heroic virtue, poetry. The second part contains the essay 'Upon the Ancient and Modern Learning,' which opened the famous controversy on the Letters of Phalaris. Temple has been considered one of the reformers of English style—'the first writer,' says Dr Johnson, 'who gave cadence to English prose.' His style wears a singularly modern air, and is smooth, flowing, and agreeable. 'What can be more pleasant,' says Charles Lamb, 'than the way in which the retired statesman peeps out in his essays, penned in his delightful retreat at Sheen? They scent of Nimeguen and the Hague. Scarce an authority is quoted under an ambassador.' Temple's pretensions to learning are merely amusing, and

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he has little real weight as a political writer, but he expatiates very pleasantly on foreign travel and country life, on flowers and fruits, on parterres, terrace-walks, and fountains. His epicurean temperament is happily and characteristically displayed in the last words of his last essay: 'When all is done human life is at the greatest and best but like a froward child, that must be played with and humoured a little to keep it quiet till it falls asleep, and then the care is over.'

His collected works fill 4 vols. (1814). The older Lives by Boyer, Swift, and Temple's sister, Lady Giffard, were superseded by the elaborate *Memoirs* by Thomas Peregrine Courtenay (2 vols. 1836), reviewed by Macaulay in a well-known and brilliant essay. The *Letters* of Dorothy Osborne, seventy-one in number, written during the last two years of their seven years' courtship, mostly from Chicksands in Bedfordshire, were admirably edited by E. A. Parry (1888).

Temple Bar, a London gateway, dividing Fleet Street from the Strand, the City from the shire. Rebuilt after the Great Fire by Wren in 1669–73 at a cost of £1398, it was removed in 1878–79, and re-erected in Theobalds Park, Cheshunt, in 1888. Its site is marked by a memorial, surmounted by an amazing griffin, and erected in 1880 at a cost of £11,550.

Templemore, a town of County Tipperary, which takes its name from a commandery of the Knights Templars, and is situated on the river Suir, 8 miles N. of Thurles by rail. Pop. 2800.

Temple Society, a body of German Christians who wait for the second coming of Christ. They separated from the church in Würtemberg and formed a separate sect; and many of them settled in Palestine in 1868, where they now have colonies at Haifa (q.v.), Jaffa, Sarona, and near Jerusalem, distinguished for industry, enterprise, and success. There may be about 5000 in all of the community, of whom about 1300 are in Palestine.

Temporal Power. See POPE.

Tenacity is that property of matter by which it resists being pulled asunder. Liquids and gases have no tenacity. In technical language, the tenacity of a substance is the greatest longitudinal stress that it can bear without being torn asunder. For example, steel bars have a tenacity of between 50 and 60 tons weight per square inch, whereas oak has a tenacity of not quite 7. With regard to metals it is found that forging and wire-drawing increase their tenacity. See STRENGTH OF MATERIALS.

Tenant, in English law, means a person who holds land under another; the payments and services which he owes to his superior constitute his tenure. Inasmuch as all land is held of the crown, no subject can be more than a tenant of land; even he who is practically absolute owner is described in legal language as tenant in fee simple. The estates in land known to the early law were of two kinds; a man might be tenant for his own life (under the crown or under a subject lord), or he might be tenant in fee, that is, he might hold to him and his heirs: both these estates were freeholds—i.e. estates worthy the acceptance of a free man. The statute *De Donis*, passed in 1285, introduced the tenant in fee tail—i.e. a fee *taillé*, cut down or restricted to heirs of the body of the tenant; see article ENTAIL. A person who held for the life of another was called tenant *pur autre vie;* this was a freehold interest, considered less certain than the interest of one who held for his own life. To prevent fraud, it is provided by statute that a person holding *pur autre vie* may be required to produce the person for whose life he holds. A tenant for his own life, or for the life of another, is a limited owner; he may not do any act which impairs the value of the inheritance; he may not, e.g., open mines or cut timber; nor may he dispose of the land to the prejudice of his successors. But the power to work mines, to grant long leases, and even to mortgage or sell the land was frequently conferred on limited owners by settlements, and similar powers are now conferred by statute, and especially by the Settled Land Act of 1882. As the protection of the courts was extended to persons occupying land under tenants in fee or for life, they also came to be called tenants. Thus, a farmer holding land for a fixed term was a *tenant for years*. if he held at the pleasure of his landlord he was a *tenant at will*, but if the landlord accepted annual rent from him this was enough to make him *tenant from year to year;* he could not then be turned out without the reasonable notice required by law. When land was held by two or more persons jointly, with benefit of survivorship, they were called *joint-tenants*. If they held the same property, their interests being separate and distinct, they were *tenants in common*. On the death of a tenant in common his share goes not to the survivors, but to his own heir or executor. A joint-tenant or a tenant in common may protect himself against waste or alienation of the property by any of his co-owners; he may also, according to modern statutes, compel a severance of the property. In this connection the word tenant is used with a certain laxity, for we speak of joint-tenants or tenants in common of money, &c., although personal property is not, strictly speaking, a subject of tenure. In popular language, tenant usually means a person holding land or house property for a term of years, or from year to year, under a contract with the owner. See TENURE, LANDLORD, and LAND LAWS. For an explanation of the connection between tenure and ownership, see Williams' *Law of Real Property* (new ed. 1887).

Tenasserim (*Ta-neng-tha-ri*), acquired by Britain after the war in 1825, the southernmost division of Burma (q.v.), is a long narrow strip of territory between the sea and the mountains of the Siamese frontier. Area, 46,590 sq. m.; pop. (1881) 825,741; (1891) 971,660. There are seven districts—the town of Maulmain, Taung-ngu, Schwe-gyin, Salwen, Amherst, Tavoy, and Mergui; the chief towns being Maulmain, Taung-ngu, and Tavoy. The town of Tenasserim, which had, through wars and other misfortunes, sunk to be in 1881 a village of only 577 inhabitants, stands 33 miles from the sea at the junction of the Great and Little Tenasserim rivers, the former of which has a total course of about 400 miles.

Tenbury, a market-town of Worcestershire, on the Teme, 22 miles NW. of Worcester. It has a spa, discovered in 1839, and St Michael's College, founded in 1855 by the Rev. Sir F. Gore Ouseley (q.v.). Pop. 2000.

Tenby, a thriving watering-place of Pembrokeshire, South Wales, 9¼ miles E. of Pembroke and 276 W. of London, is finely seated on a rocky headland overlooking Carmarthen Bay. The Cymric *Din-bach y Pysgod* ('fishy little fortress'), it was one of the Flemish colonies planted by Henry I. in Pembrokeshire, and retains a long stretch of its ancient walls, strengthened by Queen Elizabeth in 1588, and a fragment of a castle, whence in 1471 the future Henry VII. escaped to Brittany. Its mild climate, fine level sands, and capital bathing have been the making of the place, which has an interesting Gothic church (1250) with a spire 152 feet high, a colossal marble statue of the Prince Consort (1865), and a fort (1868) on St Catherine's Island. It is an ancient municipal borough, and with Pembroke (q.v.) and five other towns returns one member to parliament. Pop. (1861) 2982;

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which 'the tendons and their sheaths in the finger and hand are the seat of a severe and often most destructive inflammation, which, though often confined to one finger, not unfrequently extends to the hand and arm, attacking not only the tendons and softer parts, but exposing the bones, and disorganising the joints' (Holmes). A permanently bent finger, from adhesion of the tendon to its sheath, is a common result in severe cases of whitlow of this kind. Tendons may also be inflamed as the result of gout or rheumatism, and not very unfrequently they are the seat of syphilitic enlargements or other tumours. Fibrous tumours and small cartilaginous enlargements are often found in tendons.

Tenebræ. See GOOD FRIDAY.

Tenedos (*Bosdscha Ada*), a Turkish island in the Ægean Sea, off the Troad, and 12 miles S. of the entrance to the Dardanelles. It is 8 miles long and 2 to 4 broad, and is rocky, but not unproductive, with 7000 inhabitants. Tenedo is the chief town. Opposite Tenedos is Besika Bay (q.v.).

Tenerife, PEAK OF, or PICO DE TEIDE, a famous dormant volcano, the highest summit in the Canary Islands (q.v.), stands in the south-west of the island of Tenerife, and is 12,200 feet above sea-level. The lower slopes of the mountain are covered with forests, or laid out in extensive meadows, yielding rich grass; but the upper ridges and the Peak, properly so called, are wild, barren, and rugged in appearance. The Peak El Piton and its two inferior neighbours, the Montana Blanco and Chahorra (9880 feet), rise from a rugged circular plain of lava debris and pumice, 7000 feet above sea-level, about 8 miles in diameter, and fenced in by an almost perpendicular wall of rock. From the crevices sulphurous vapours are constantly exhaling. The wall of the crater at the top is formed of broken and jagged porphyritic lava rocks, is elliptical, 300 feet in diameter, and 70 deep. The colour of the whole is white. There is an ice cave at an altitude of 11,000 feet. The Peak can be seen more than 100 miles off. In 1795 and 1798 there was volcanic activity here.

See *Tenerife*, by C. Piazzi Smyth (1858), who made a series of experiments here; Olivia M. Stone (who ascended the peak), *Tenerife and its Six Satellites* (new ed. 1889); G. W. Strettell, *Tenerife* (1890).

Tenesmus (Gr. *teinein*, 'to strain') is the term applied in Medicine to a straining and painful effort to relieve the bowels when no fæcal matter is present in the rectum; the effort being excited by some adjacent source of irritation. It is a common symptom in dysentery, irritation of the bladder, stricture of the urethra, &c.

Teniers, DAVID, the Elder, a Flemish master, was born at Antwerp in 1582. A pupil of Elsheimer at Rome and Rubens at Antwerp, he was admitted to the painters' guild of St Luke in his native city, and died there on 29th July 1649. His subjects are in general homely, the interiors of public-houses, rustic games, weddings, and the like; but they are full of reality, charm of colour, and happy ease of composition.—DAVID TENIERS, the Younger, son of the preceding, was born at Antwerp, 15th December 1610. He received his first lessons from his father, and the influence of his own contemporary, Adrian Brouwer, is strongly marked on his earlier work. He rose quickly to distinction, enjoying the favour and friendship of the Archduke Leopold William, Don Juan, bastard son of Philip IV. of Austria, the Prince of Orange, the Bishop of Ghent, and other dignitaries. His first wife was a daughter of the painter Breughel. He was admitted 'master' of the guild of St Luke in 1632, and in 1644 was elected its president by the common council of Antwerp; in 1647 he took up his abode at Brussels, where he died, 25th April 1690. Of his pictures John Smith in his *Catalogue Raisonné* enumerates no fewer than seven hundred. They possess, but in superlative degree, the qualities that mark his father's work. In the tone of his skies, the drawing of his trees, the animation and grouping of his figures, we see everywhere the presence of a richer, finer, more observant and more imaginative genius. None has realised more richly the charm of joyous open-air life. His scriptural subjects alone are unsatisfactory.

See also Kugler's *Handbook to the German, Flemish, and Dutch Schools*, remodelled by Waagen, rewritten by Crowe (1874).

Tenison, THOMAS, Archbishop of Canterbury, was born at Cottenham in Cambridgeshire, 29th September 1636, studied at Corpus Christi in Cambridge, and after holding several cures was made Bishop of Lincoln by William III. in 1691, and primate of all England three years later. He was a favourite at court, held many important state offices, and attended Mary and William on their death-beds. He crowned Queen Anne and George I., being a strong supporter of the Hanoverian succession, and died 14th December 1715. His works comprised some anti-papal tracts, sermons, and a criticism of Hobbes.

Tennant, WILLIAM, the author of *Anster Fair*, was born May 15, 1784, at Anstruther in Fife. A cripple almost from his birth, he naturally took to reading, and in 1799 went to the university of St Andrews, but was compelled to leave after two years to act as clerk to his brother, a corn-dealer. The business soon failed, and in 1813 Tennant was fain to accept the situation of parish schoolmaster at Dunino, near St Andrews, with a salary of £40 a year. The year before he had published his *Anster Fair*, a poem of much sprightliness and humour, notable as the first attempt to naturalise in our language the gay *ottava rima* of the Italians —soon after to be adopted with splendid success by Byron in his *Beppo* and *Don Juan*. A highly laudatory notice of the poem appeared in the *Edinburgh Review* in 1814, from the pen of the then omnipotent Jeffrey. In 1816 Tennant became a teacher at Lasswade near Edinburgh, whence three years later he was transferred to a mastership in Dollar Academy. His attainments as a linguist were extraordinary, and in 1835 he was appointed by the crown to the chair of Oriental Languages in the university of St Andrews. He died near Dollar, 15th February 1848. Tennant never equalled his first poem, although there was no little merit buried with the *Thane of Fife* (1822), *Papistry Stormed* (1827), and even the dramas of *Cardinal Beaton* (1823) and *John Baliol* (1825). See the memoir by Matthew Conolly (1861).

Tennemann, WILHELM GOTTLIEB, historian of philosophy (1761–1819), lectured at Jena, became professor at Marburg in 1804, and wrote, from the Kantian point of view, a *Geschichte der Philosophie* (vols. i.–xi. 1798–1819), and a shorter history (1812), translated as a *Manual of the History of Philosophy* (1852), long a text-book in Britain.

Tennent, SIR JAMES EMERSON, born in Belfast in 1804, studied at Dublin, and after practising at the bar was sent to parliament in 1832. He first supported Earl Grey and then Peel, and was secretary successively to the Indian Board, to the government of Ceylon, to the Poor-law Board, and to the Board of Trade. He was made a baronet on his resignation of the last post in 1867, and died in London, 6th March 1869. He is best known for his great work on *Ceylon* (1859) and books of travels in Greece and Belgium.

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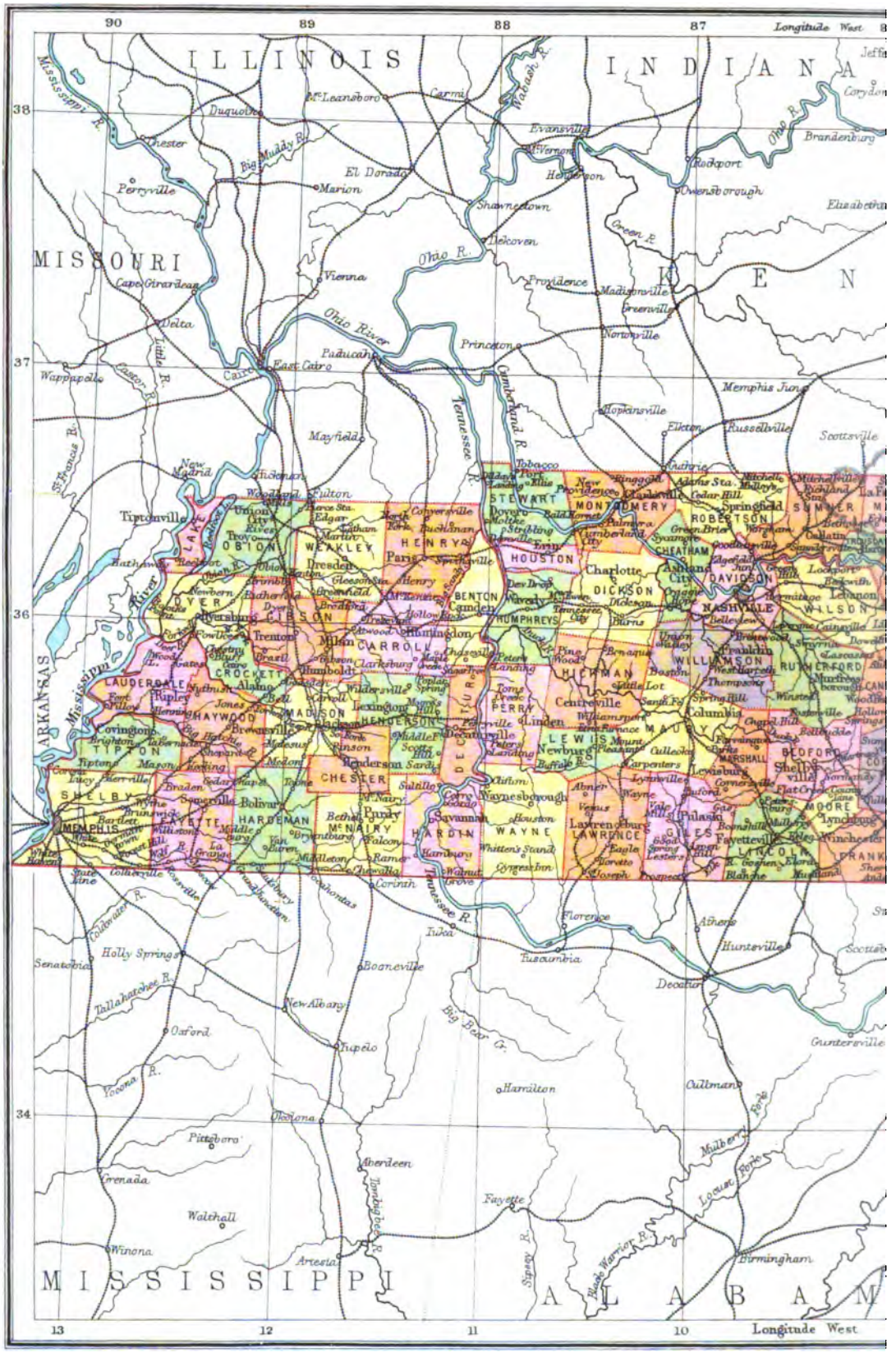
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Green R.
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Aberdeen
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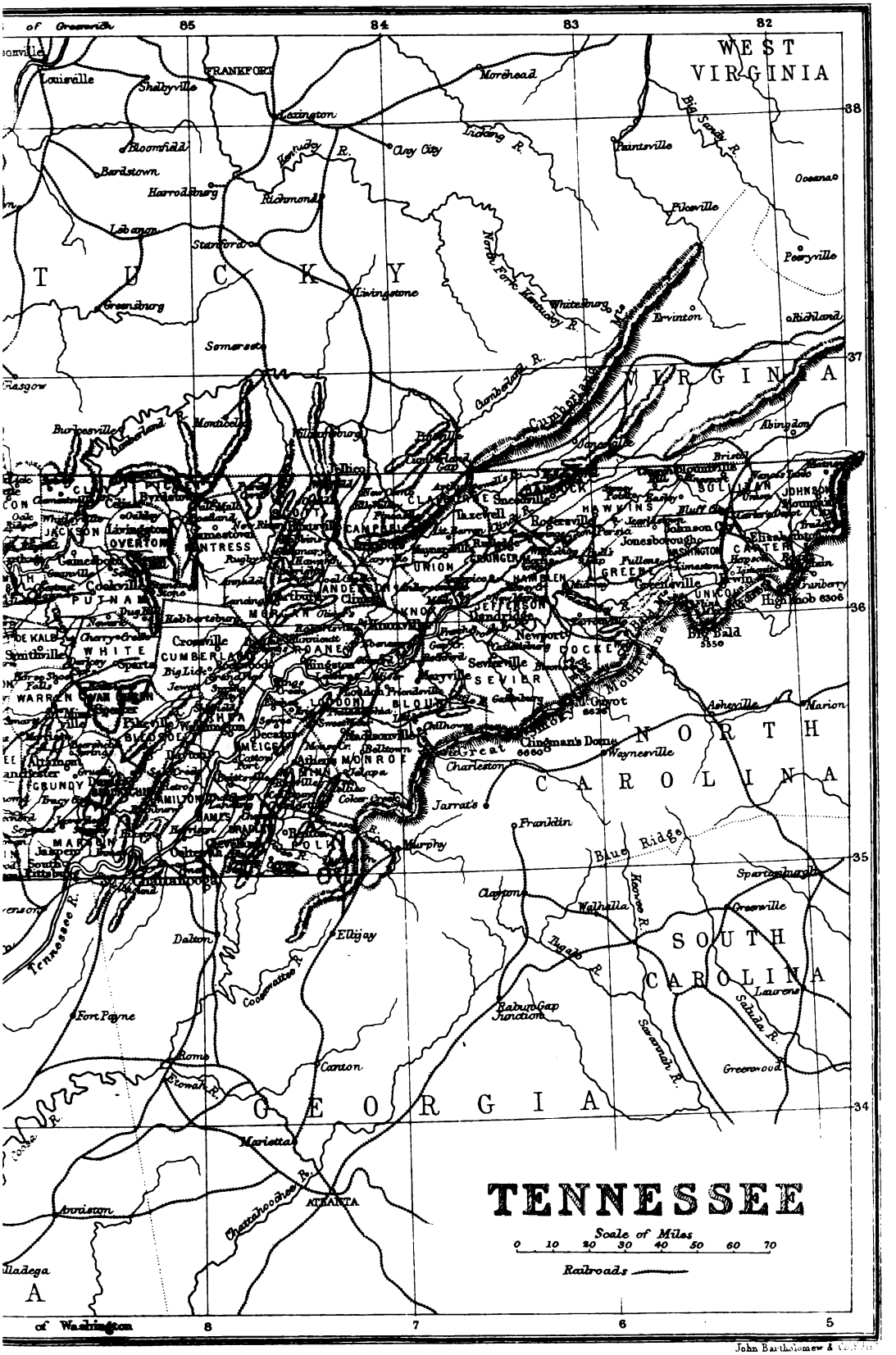

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Tennessee, one of the central southern states of the American Union, the twenty-ninth in area and thirteenth in population, is situated in the Mississippi Valley in 35°—36° 30′ N. lat. and 81° 37′—90° 28′ W. long. On the N. are Virginia and Kentucky, on the E. is North Carolina, on the S. are Georgia, Alabama, and Mississippi, and on the W. the Mississippi River separates it from Arkansas and Missouri. Its mean length is 385 miles, its mean width 109 miles; area, 42,050 sq. m. Politically the state is divided into East, Middle, and West Tennessee, and these sections may rudely serve as natural divisions in describing its surface and physical characteristics, though the variety presented in topography, geology, soil, climate, and the habits and occupations of the people represents the corresponding features of the states by which it is bordered. East Tennessee extends from the Unaka and Smoky Mountains, which form the eastern boundary of the state, to the crest of the Cumberland Plateau. It contains some of the greatest ridges of the Appalachians, and abounds in magnificent scenery. Between the eastern ridges and the plateau stretches a valley region about 100 miles in width, broken by minor elevations and depressions. This valley slopes gradually from the north toward the south, and has an average elevation of about 1000 feet. Along its western edge the plateau rises in a bold wall from 100 to 200 feet high. The table-land has a broad flat top covered in places, especially toward the north, with the superimposed ridges and peaks of the Cumberland Mountains. Its western edge has a ragged contour notched by numerous 'coves' and valleys. The southern end is divided into two arms by a deep gorge with perpendicular sides rising from 800 to 1000 feet above the valley. The Sequatchie River flows through this trough until, near the southern border of the state, it is absorbed by the Tennessee River, which, breaking through the eastern arm, follows the valley for a distance of 60 miles into Alabama. The river then turns, and breaking through the western arm re-enters the state after forming part of the boundary between Alabama and Mississippi. Between the Tennessee River in its northern course and the Cumberland Mountains is Middle Tennessee, presenting a varied landscape of mountains, plains, hills, and valleys. It may be described as an extensive elliptical basin surrounded by an elevated rim. Between the Tennessee and the Mississippi rivers lies the western division of the state. The narrow valley of the former river is skirted on the west by a ridge running north and south across the state. From this divide a rolling plain slopes towards the west, terminating in a steep bluff, beyond which are the alluvial bottom lands of the Mississippi.

Nearly all the geological periods are represented to a greater or a lesser degree, from the ancient metamorphic rocks of the mountains in the east to the recent alluvium of the Mississippi River bottom. Silurian deposits predominate in the mountain-region and in the valley of Middle Tennessee. Surrounding this valley are different groups of Carboniferous rocks, and in the Cumberland Plateau is a part of the great Appalachian coalfield. The coal-measures occupy an area of 5100 sq. m., and the seams are of exceptional thickness. It has been estimated that the available supply of bituminous coal is at least equal to that of Pennsylvania. West of the Tennessee River broad strips of Cretaceous and Tertiary deposits cross the state parallel to the alluvial bed of the Mississippi. The deposits of iron ore in different parts of the state are practically inexhaustible; copper and zinc are found, and the beautiful marbles are widely celebrated. Several famous mineral springs are the resorts of invalids. The soils of the state are fertile, and the forests of hard-wood timber constitute a great natural source of wealth.

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The climate is mild and delightful, but marked by variety, which is due to numerous causes arising from geographical position and topography. The average length of time between killing frosts is 200 days. Herbage is often green throughout the year, and cattle generally graze during the winter months. The rainfall is ample, amounting to an average of 54 inches. The drainage of the state is ultimately received by the Mississippi. The Cumberland River, which enters the state from Kentucky, flows about 150 miles through the northern central part and then re-enters Kentucky. The Tennessee (800 miles), the largest affluent of the Ohio, formed by the union of the Clinch and the Holston, leaves the state and returns to it as has already been described.

Agriculture has been and still is the leading industry, but the mining of coal and iron and manufacturing are rapidly growing interests. All the cereals and fruits of the temperate zone flourish in Tennessee. The staple crops are corn, cotton, hemp, tobacco, and pea-nuts. The principal cotton districts are in the south-western corner of the state and in the southern part of the central basin. Stock-raising is extensively carried on. The production of pig-iron has greatly increased, and the number of factories for employing the raw material in the manufacture of machinery, agricultural implements, &c. has been proportionately augmented. There are also many cotton, woollen, flour, and paper mills, besides tobacco-factories and potteries. Within the limits of the state there are about 2700 miles of railroad.

Tennessee contains ninety-six counties, and returns ten members to congress. The most important towns are Nashville, the capital and largest city, Memphis, Chattanooga, and Knoxville. The state has a good system of public schools, with normal school instruction afforded from the proceeds of the Peabody fund, and there are many excellent private schools. The Vanderbilt University is at Nashville, and there are over twenty collegiate institutions in the state. The first permanent settlement was made on the Tennessee River, about 30 miles from the present site of Knoxville, in 1756. The early settlers asked and received the protection of North Carolina in 1776, and their territory was known as Washington county. In 1785 they organised the state of Franklin, and continued to dispute their rights with North Carolina till 1789, when the territory was ceded to the United States. In the following year territorial government was established, and in 1796 Tennessee became a state. It was the last of the southern states to secede in 1861, and the first to re-enter the Union in 1866. Pop. (1800) 105,602; (1850) 1,002,717; (1880) 1,542,359 (403,528 coloured); (1890) 1,767,518 (434,300 coloured).

See Histories by Ramsey (Phila. 1860), Carpenter (Phila. 1863), and Phelan (Boston, 1889); and Thruston's *Antiquities of Tennessee* (Cin. 1890).

Tenniel, JOHN, caricaturist, was born in London in 1820. A self-trained artist, he was selected in 1845 in competition to paint one of the frescoes—Dryden's 'St Cecilia'—in the Houses of Parliament. But to the public he is known not as painter, but as book-illustrator, and chiefly as the cartoonist of *Punch*. He joined its staff in 1851, and year after year since Leech's death produced the principal weekly political cartoons for *Punch*, which are notable not less for their pathos than for their wit, humour, and skilful draughtsmanship. His illustrations to *Alice in Wonderland* and *Through the Looking-glass* are

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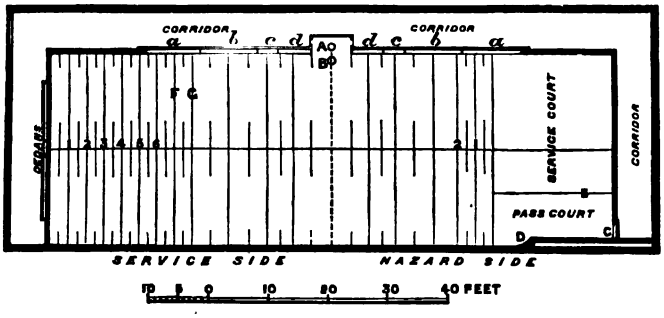
remarkable for their grace, delicacy, and finish; earlier book-illustrations were to *Æsop's Fables*, Moore's *Lalla Rookh*, the *Ingoldsby Legends*, &c. He is a member of the Royal Institute of Painters in Water-colours.

Tennis, a ball-game, is of foreign origin. *Longue paume*, in which a ball was struck to and fro with the hand, was played in the *fossés* of French and Italian châteaus in the middle ages. By the 14th century enclosed courts were common in France, and shortly afterwards some form of racket was introduced, but the prototype of the modern implement was of so elementary a character that another century elapsed before it superseded hand play. The numerous allusions to tennis found in English literature, from Chaucer onwards, prove that it has been played in England since the 14th century. It was the favourite pastime of several of the kings, and at one time became so popular that laws were passed prohibiting it. The expense of building and keeping up a court has confined the game to the aristocracy, but the fact that nearly a dozen courts were built during 1881–91 proves that it is by no means out of favour.

Scarcely two courts in existence are identical in all respects; the dimensions given below are therefore taken from the typical court in Mr Marshall's *Annals of Tennis*. The dedans and corridor are covered by a sloping wooden roof, 7 feet 2 inches from the floor, called the penthouse. The dedans, galleries, and grille are openings in the wall below the eaves of the penthouse. The net is 3 feet high at the centre, 5 feet at the sides. The racket consists of a strong hoop of ash tightly strung with black gut, with a wooden handle, the whole being 2 feet 2 inches long, and weighing about 16 oz. The ball is made of woollen material covered with white cloth, and weighs 2½ oz. A set of six dozen balls is in use at one time, and a set will last fifty years or more if re-covered and moulded into shape from time to time.



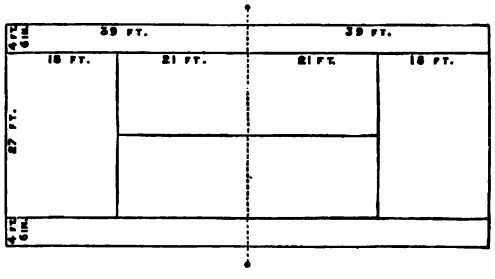
Plan of Tennis Court:

a, *a*, last gallery; *b*, *b*, second gallery; *c*, *c*, doors; *d*, *d*, first gallery. A, marker's box; B, basket for balls; C, the grille; D, the tambour; E, pass line; F, chase, last gallery; G, chase, a yard worse than last gallery; H, net.

The game may be played by two or four players. The server stands anywhere on the service side of the court and strikes the ball, so that it drops in the service-court after first touching the side penthouse. The striker-out must return it over the net either at the volley or first bound. A player scores a stroke (1) when he hits the ball into a winning hazard, viz. dedans, grille, or last gallery on the hazard side; (2) when his opponent hits the ball into the net, out of court, or loses a 'chase.' The latter term requires some explanation. When a ball falls—i.e. touches the floor for the second time—on or between any of the lines marked across the court, or enters any of the galleries except the winning gallery, the marker calls out 'chase six,' 'second gallery,' 'better than two,' according as it falls 6 yards from the end wall, in or opposite the second gallery, or between the 1½ and 2 yard lines. When two chases have been made, or one if either of the players is within a stroke of the game, they change sides, and if the striker-out succeeds in making the ball fall nearer the end wall than his opponent had done, he wins the chase. If he makes the same chase it is called 'chase off,' and the score is not affected. When a player wins a stroke the score is called '15—love.' His next stroke brings him to 30, then 40, then game. Thus four strokes may win a game, but if both players reach 40 the game is called 'deuce,' and it is necessary to win two strokes more in succession to secure the game. A 'set' is the best of eleven games. The origin of this method of scoring is doubtful. The most obvious explanation is that in French courts there were fourteen chases, and so they began scoring at 15 to avoid confusion; but there seems to be conclusive evidence that this system of scoring was introduced before chases were in use.

LAWN-TENNIS, though the offspring of tennis, quickly surpassed her parent in importance; she has even usurped her name. The prescriptive right of centuries is of no avail against the fiat of the people, and now probably 99 per cent. of those who use the word tennis refer to the younger game. Major Wingfield is generally credited with the invention of lawn-tennis in 1874, and perhaps he had more to do with its introduction than any one else. His 'sphairistiké' was a compromise between tennis and badminton, and in principle—viz. hitting a ball over a net into a space marked out on a lawn—was identical with the lawn-tennis of the present day, but most of the details have been altered. The tendency of the age is towards increased pace in all things, and lawn-tennis is no exception to the rule. The net has been lowered from 5 feet at the sides and 4 feet in the middle to 3 feet 6 inches at the sides and 3 feet in the middle. The balls have become more lively, the rackets more tightly strung. The result of these developments was to give the server a great advantage, and this had to be obviated by bringing the service-line nearer the net—from 26 feet to 21 feet.

The tactics of the game have altered no less than the implements. In early days play was confined for the most part to the back of the court, then it was found that a volley at the net was a deadly form of attack; but it is now generally recognised that both for the single and double game the service-line is the strongest position to occupy, as from here it is easy to run forward to kill a ball by a 'smash,' or retreat when it is necessary to get



Plan of Lawn-tennis Court.

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back a severe stroke of the opponent or return a 'lob.' The game is usually played on grass, the lines being marked out with 'whiting;' but asphalt, cinders, and various other substances have been tried, and covered courts with wooden floors enable it to be played in wet weather. The racket should weigh from 14 to 15 oz.; for ladies, 12½ to 13½ oz. The balls are made of hollow india-rubber, covered with white cloth, and weigh 2 oz.

All legislation relating to the game is now in the hands of the Lawn-tennis Association. The inner court, 27 feet wide, is used for the single game, the 36-feet court when four are playing.

Besides the volume in the Badminton Library by J. M. and C. G. Heathcote, there are works on tennis by Julian Marshall (1878 and 1889) and others.

Tennyson, ALFRED, BARON. An attempt to sketch the career of a poet happily still among us must necessarily be partial and incomplete. Detailed criticism of his work, even if adequate power for a task so large were present, would be here out of place. But for some such glances of its quality as one may catch of the beauty of the landscape when passing a window—seen *per transennam*, as the picturesque old phrase has it—the writer hopes he may obtain pardon.

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Space also forbids here any complete bibliography, either of Lord Tennyson's own poetry, of the many translations from it in European languages, or of the endless pages which have been published in the way of criticism or narration of the facts of personal history. For the latter the writer is partly indebted to the volumes of Mr W. E. Wace (1881), and Mr H. Van Dyke (2d ed. 1891), but in a much larger degree to authoritative sources.

Alfred, Lord Tennyson, was born on August 6, 1809, at Somersby, a little village among the wolds of Mid-Lincolnshire; rector of which was the poet's father, Dr George Clayton Tennyson; his mother, Elizabeth Fytche, being also of a Lincolnshire family. Dr Tennyson was a man of marked physical strength and stature; accomplished in fine art, music especially, and in language; in temperament imaginative, verging at times upon gloom. These conditions, more or less, reappeared in his family. Johnson's pretty phrase about his own college, 'a nest of singing birds,' might be applied to the Somersby parsonage. Alfred was third of seven sons; amongst whom his two elder brothers, Frederick and Charles, became notable as poets. Frederick Tennyson in 1854 published *Days and Hours;* in 1890, the *Isles of Greece;* in 1891, *Daphne and other Poems.* A notice of Charles (Tennyson) Turner will be found in its place. To the latter Alfred was devoted with a child's warm love and reverence, which break forth tenderly in the *In Memoriam*, and later in the *Midnight* of June 30, 1879. Charles, whilst both were little, 'gave him a slate, and bade him write some verses about the flowers in the garden.' The slate was soon covered; Charles read the lines, and gave them back with a 'Yes, you can write.' Some ten years later, *Poems by Two Brothers* (1826) witnessed to that profound early union of heart and soul between Charles and Alfred. Of this little book it will be enough to say that it shows, even if imitatively and immaturely, wide range in subject and varied command of metre. Already in fact, at thirteen or fourteen, Alfred had written a long epic, of which Dr Tennyson, an excellent and well-read scholar, said: 'If that boy dies, one of our greatest poets will have gone;' a paternal prophecy the fulfilment of which perhaps justifies its preservation. Byron at this time was the leading modern favourite of the brothers. At the fatal news from Missolonghi (April 1824) the world seemed at an end to Alfred, who, boylike, commemorated the event by carving upon a sandstone rock—*Byron is dead.*

As the landscape of Warwickshire has been traced in Shakespeare's early work, so in Tennyson's appears that of Lincolnshire; a county far more picturesque than many fancy, in its great contrasts of hill and level, wold and fen. Here was his earliest education through the most susceptible years of life. Near Somersby is Louth, where the brothers found their classical school; near also, Horncastle, where grew up meanwhile for Alfred the hope of youth, the blessing and mainstay of after years.

In October 1828 the 'two brothers' joined Frederick at Trinity College, Cambridge, finding presently a group of friends among whom many fulfilled the promise of their May: J. Spedding, J. M. Kemble, W. H. Brookfield, R. C. Trench, R. M. Milnes, C. Merivale, H. Alford, E. Lushington; and, above all (October 1829), Arthur (born February 1811), eldest son to Henry Hallam, the great historian. Early as he was lost (September 1833), sufficient proof exists that the commanding influence which the youthful Arthur held over his most gifted contemporaries, in that golden day of English youth; that the pictures of the past and anticipations of the future set forth by Tennyson in the famous memorial poem—all were fully justified by his singular ability, by his depth and tenderness of thought, by his beauty of nature. In this genial atmosphere Tennyson's genius rapidly advanced. To this time belong *The Lover's Tale* (written 1827, published 1879), a blank verse rhapsody, and *Timbuctoo*, the poem (also in blank verse) by which he gained the university prize of 1829. Both pieces in general colour and in single phrases anticipate the style by which Tennyson presently became (and remains) known to us: he has already left the prelusive attempts of early youth; he has fairly found himself. After the appearance of *Timbuctoo*, A. Hallam wrote: 'I consider Tennyson as promising fair to be the greatest poet of our generation, perhaps of our century.'

His father's death broke off Tennyson's Cambridge residence early in 1831. In the autumn he made that visit to the Pyrenees recorded in the beautiful *All along the valley.* Meantime his first published volume, *Poems, chiefly Lyrical*, had appeared (1830), followed by a similar small series in 1833. 'That greatest of persecutions, Silence,' has never been our poet's fate; he was now pelted and praised, misjudged and rightly judged—the common lot. But he turned to profit friend and enemy, dropping many less mature pieces, steadily studying and practising an art in which supreme excellence is never dissociated from intensity of labour: poor, and under the cloud of grief for the friend who had passed away in Vienna, 'and beloved of the gods.' To these nine years, spent partly in Lincolnshire, mostly in London, we owe many of his most lovely lyrics; some, the subjects of which were reworked or much expanded in later years. Together with the best of his earlier work, these were published in 1842. Henceforth his place was secure. 'He is decidedly the first of our living poets,' wrote Wordsworth in 1845, 'and I hope will live to give the world still better things.'

1847 brought *The Princess: a Medley*, or melodrama, we might say, written in blank verse, almost lyrical in its music; gay and fanciful as *The Midsummer Night's Dream* in plot, yet with the seriousness of life in its underlying chivalrous moral.

Should we say that to 1850 Tennyson might

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look back as his *Annus Mirabilis?* This year, at least, in succession to Wordsworth, brought him the laureateship; and in this fell the publication of *In Memoriam*, that elegiac treasury in which the poet has stored the grief and the meditation of many years after his friend's death; a series of lyrics which in pathos, melody, range of thought and depth of feeling may stand with the *Canzoniere* of Petrarch and the *Sonnets* of Shakespeare. But that early widowhood of love was now happily closed (June 13) by the marriage—to which the poet, and we with him, may we not add? owe so much—with Emily Sellwood, in Shiplake Church, Oxfordshire.

Tennyson and his wife now settled at Twickenham. In 1851 they went through the Riviera to Florence, returning by Milan. In 1852 Hallam, his eldest son, was born; the great funeral Ode upon Wellington was written. By the close of 1853 the passion for his old country life, freedom and peace, and fair English scenery, carried him to Farringford in Freshwater. There Lionel was born (1854); and there, with Sir John Simeon as his highly prized neighbour, and frequent brief journeys interspersed, Tennyson lived uninterruptedly till 1870; having built meanwhile a house for summer and autumn residence (Aldworth), high up on the farther side of Blackdown by Haslemere: at once nearer London, and farther from that intrusion which is one of the penalties paid for fame. Some of these journeys may be recorded; they form no unimportant part of a poet's tranquil life. They included the Western Highlands, Staffa and Iona (1853); Inveraray (1858), to visit the Duke of Argyll, another much-valued friend; Portugal (1859); Cornwall (1860); the Pyrenees again (1861); Derbyshire and Yorkshire (1862); Weimar and Dresden (1865); Dartmoor and Salcombe (1867); North Wales (1869).

Lyrical poetry pure—free from divergence down those 'two byways' (as Schiller named them), the didactic and the rhetorical—in perhaps every one of its forms, had been now set forth by the poet: the lyric of melody, of passion, of description, of travel, of incident, of reflection; the ballad, the personal song, the elegy, the national ode. And the idyll—'that little picture' which has a natural but not exclusive affinity with country life and narrative gently suffused with passion—was also included. It remained for the poet to carry further these modes of song, and to add in particular the drama proper, with the humorous monodramatic presentation of character in rustic forms of speech.

In *Maud: a Monodrama* (1855), Tennyson has given to the personal lyric (for *In Memoriam*, strictly speaking, is elegiac in movement) its deepest and widest extension. As with Hamlet, a taint of mental distraction is supposed to affect the narrator and hero of the drama; leading him to over-colour, through the light of personal feeling, his pictures of the world about him, the politics and manners of the time; whilst the same stress of nature has raised the songs which paint his love-story, in its triumph and its despair, to a sevenfold fire of passionate melodious beauty. Lyrical poetry, unless it were among the Æolic singers of early Greece (so far as the writer knows), has attempted no such scheme as that presented by *Maud;* and the poem may perhaps in popular estimate have suffered the penalty which thoroughly original treatment seldom escapes.

As *Maud* extends the domain of Tennyson's lyrical work in depth of feeling, variety of subject, and area traversed by the narrative, so that 'small picture,' the idyll, epic and historic, tale and character-picture, was treated by him henceforth. To this enlargement witness first the *Enoch Arden* and *Aylmer's Field* of 1864. The poet's power had reached full maturity; his art was perfect. He now took up seriously that Celtic legend which, lacking adequate Teutonic material, England for eight centuries has welcomed as her national epic—our old Arthurian story, to which he had preluded already by a few beautiful sketches; and in 1859 appeared the first four of the twelve *Idylls of the King*, completed by instalments in 1870, 1872, 1885.

Spread thus over more than a quarter of a century, this is the poet's most important, probably his greatest work. Space fails here to do more than indicate the misty, much-debated origin, and development of the romance of Arthur. At first the real Prince, or Gwledig, defeating his foes in the old Welsh kingdom of Strathclyde, perhaps about 500 A.D.; his figure then goes through some centuries of obscurity, reappearing by the middle of the 12th, first as a European conqueror in Geoffrey of Monmouth; then presently in his mythical aspect, possibly confused with some pagan divine hero, Lord of the Round Table; finally passing to Avalon, *rex futurus*. From that time the tale spread like wildfire over Europe, and soon after 1200 Arthur's name and deeds were celebrated in many romances, English, Welsh, French, German, even Icelandic; collecting about him other scattered Celtic legends, notably that of the *Grail* (see note at end of this article). Malory lastly, that 'most unintelligent compiler' (A. Nutt, *Studies on the Legend of the Holy Grail*, 1888), but gifted with an admirable style, selecting from the vast mass of material, framed, treating it freely in the manner of his day, the *Morte Darthur* (published by Caxton 1485); whence Tennyson has taken, again varying them, most of his legends: that of Geraint and Enid, from Lady C. Guest's admirable translation of the Welsh *Mabinogi*, being the chief exception.

Picturesque as the old story however became, throughout its many modifications of five centuries and more, it could hardly have been lifted above a poetic-antiquarian interest for Englishmen generally, were its early tone and quality and adventures repeated in modern verse, however skilful. This difficulty has been felt before with regard to our own and other mediæval romances. Ariosto by skilful serio-comic treatment gave a vitality which is now well-nigh exhausted to the legends of Charles. Spenser turned Arthur and his knights into an allegory, with constant allusion to Elizabethan times. And similarly that *quidlibet audendi potestas* which Horace with absolute right claimed for the poet has been everywhere exercised by Tennyson in the *Idylls*. Throughout they are interfused with the vital atmosphere of the Victorian age; and by no other mode could the king return, as it were, and live again in the hearts and souls of men. The fitness of this great change, which presents Arthur not as noble, guilty, and repentant, but as noble, blameless, self-restrained, and far-sighted, is of course fairly debateable. Tennyson has throughout imagined the king as he appeared to the old Welsh historian: 'God has not made, since Adam was, the man more perfect than Arthur.' Nor is it easy to see how the needful central figure for the Arthurian epic, as imagined in its unity by Tennyson, a figure at once human and ideal, could otherwise have been presented; although whether in his picture the delicate balance has or has not been kept may perhaps long remain a fit subject for critical declamation.

The noble *Dedication* (as indeed was already noted in the prelude to the *Morte d'Arthur* of 1842) sets forth the main underlying intention of the *Idylls*. They are a 'new-old' tale, 'shadowing

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Sense at war with Soul;' the individual conscience with its innate aim towards truth and purity; its temptations, falls, and conquests; its final victory, discovered only in the true life which follows our brief breathing space upon earth. This inward conflict is displayed under the guise of the legend how Arthur, through the Round Table (that late mediæval picture of imagined chivalry), the knights and ladies of the court, tries to lead a crusade on behalf of a perfect civilised Christian state; how also, through the sins and selfishness of his followers, the fair Utopia is here never realised. It is a tale, not a mere allegory, although allegory be occasionally introduced; the persons, each in turn, are the mixed human characters of all times, whilst one clearly defined quality figures some bias or aim which dominates the life of each, working evil or good for himself and his fellow-creatures. Jealousy marks Geraint; woman's longsuffering patience, Enid; in Elaine we have pure passionate devotion, cast away by Lancelot in favour of guilty love for Guinevere; in Percivale and Galahad, ideals of a devoted holiness, souls of whom the world is not worthy, and who have little place in its struggles, yet whose example the world could not afford to miss. But we narrow and harden by such definitions the rich flexible vitality of Tennyson's Titianic picture, with its endless touches of light and shadow, its breadth and liberality of varied palpitating colour; the modulations (to take another figure) through every key of passion and character, the ever-present yet ever-appropriate melody of the metre. But, more fortunate than the musician, the score of the poet's symphonies is not only in the reader's hands, but, according to his faculty, he may reproduce the music for himself:

> Heard melodies are sweet, but those unheard
> Are sweeter.

Arthur, *rex quondam, rexque futurus* (as we may believe) for many generations, has been thus set before us in our British epic. Small, however, is the element of probable fact in that ancient legend. It was hence, perhaps, natural that a poet-laureate, who, like his great predecessor, feels for England 'as a lover or a child,' should attempt to deal with the realities of our magnificent history. Add that in many pieces, monodramatic in form, Tennyson has shown brilliant power to create character, seriously presented or with admirable humour, and that he has also been ever bold to enlarge the bounds of his art. Thus three plays, spread in subject over some four centuries, have been the result—*Queen Mary* (1875), *Harold* (1877), *Becket* (1884). And with these, certain less important dramas may be named: *The Cup*, founded on a Graeco-Roman tale; *The Promise of May*, a modern domestic piece; *The Foresters* (1892), the poet's own version of the Robin Hood legend.

Dramatic art is, however, hampered by many peculiar laws and limitations; nor is the close air of modern civilisation favourable as that of the 16th and 17th centuries to the poetical drama. Nor, again, does the highest gift for character or incident-drawing carry with it necessarily the power to put incident into dialogue, or to make the most of dramatic situations suitable to the theatre. Even Scott, with his Shakespearian invention, and also eminently effective when the persons in his novels speak together, yet failed when he attempted the stage; nor can Goethe or Byron be credited with better success. And, similarly, no play of Tennyson's hitherto acted (unless with exception of *The Cup*) has (in England, at least) reached definite popular acceptance. The time, in truth, to estimate their spectacular value has not yet arrived. But that they form a noble contribution to our history may, we hold, be considered certain.

A few more volumes, idylls, lyrics, ballads, remain (1880, 1885, 1886, 1889, 1890). Compared with much of Tennyson's earlier work, these, in general, reveal a more mature and certain art, a greatly wider range. History (mostly English); tales in dialect, chiefly that of Lincolnshire; a few beautiful classical pieces; narratives, idyllic and lyrical, of the profoundest pathos; poems treating great problems in religion and morality, philosophy and science—all, with other 'fresh fields' which we have not space to name, are included. The more decoratively imagined art, frequent in the poet's youthful verse, has now, by natural law, given place to art not less finished, but deeper, often darker, in thought. If, compared with *In Memoriam*, a gloomier scepticism is allowed to speak, faith reaches a sweeter and surer creed. Titian, in a word (and our last), has made way for Rembrandt.

A few personal notes, however, must be added. Before advancing years restrained, without seriously injuring, his activity, Tennyson, in 1876, once more visited the Pyrenees; in 1878, Ireland; 1882, Lombardy; 1883, Copenhagen; 1887, St. Davids and the Channel Islands; 1891, Devonshire.—The losses and the gains of prolonged life he has been called on to experience. Beside many among the band of earlier friends, his brother Charles was taken in 1879; his younger son Lionel, after an honourable career in the public service, in 1886. Hallam, the elder, married Audrey Boyle, grand-daughter to Admiral Hon. Sir Courtney Boyle, one of Nelson's captains, in 1884. And several children of the brothers renew the charm and sunshine of youth to Aldworth and Farringford.

Lastly, in 1884 Her Majesty, ever gracious, recognising even more than conferring honour, created a barony of the United Kingdom by the style of Tennyson of Freshwater and Aldworth, in favour of her poet-laureate.

For detailed criticism, this, we have said, is neither the place nor the time. Natural it is, indeed, to ask what, when a century or more has gone by, will be Tennyson's rank in the hierarchy of Parnassus? But of this 'the days to come will be the wisest witnesses.' Even were it possible now to estimate the absolute value of his whole work, two weighty and inevitable determinants of future fame are absolutely beyond foresight—namely, What near successors any man is fated to find—the question, whether or not, as Dante observed, a Giotto shall follow a Cimabue, and 'have the cry' and obscure his fame:—And what will be the career (upward or downward, folly alone would affect to decide) of the world's civilisation. Some slight general hint, however, as resting on grounds which no one is likely to dispute, may be risked in regard to Tennyson's general relation to his five great British predecessors during the first half of the century—Scott, Byron, Keats, Shelley, Wordsworth—remembering also that among these only the first and the last reached the 'mezzo del cammin di nostra vita.' And this suggestion we shall express after the terms employed by the great critic Quintilian when giving his reasons to place Virgil at the head of Latin poetry. If there be certain gifts of genius wherein Lord Tennyson yields to those illustrious contemporaries of his youth, each in his turn, it is beyond question that during his many years he has written with more constant, more equal *cura et diligentia;* that his mastery of his sublime art has been more perfect; that in range and command of varied subject he has been unequalled.—But, to close with better words than

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poet received from his old friend Robert Browning may be here added :

'29 De Vere-gardens, 5 *Aug* 1889

My dear Tennyson—To-morrow is your birthday—indeed a memorable one. Let me say I associate myself with the universal pride of our country in your glory, and in its hope that for many and many a year we may have your very self among us —secure that your poetry will be a wonder and delight to all those appointed to come after. And for my own part, let me further say, I have loved you dearly. May God bless you and yours.'

Note upon the Holy Grail.—This tale, by far the most singular of the *Idylls*, has been recently investigated by Mr A. Nutt in his *Studies* (1888), and by Professor Rhys in his *Arthurian Legend* (1891). Briefly, it does not seem to have been placed in the Arthur cycle before about 1190; appearing first in the *Conte del Graal* of Chrestien de Troyes, founded unquestionably on far earlier lost traditions. In this romance Perceval is the hero of the Quest, but presents no spiritual ideal; nor are the three original 'talismans' of the Grail (sword, lance, and cup) connected definitely (so far as Chrestien's unfinished tale goes) with Christian symbolism. So also in the *Mabinogi*, which is much indebted to Chrestien. Presently, however, another romance, the *Queste*, makes Galahad the hero; for whom, finally, at the close of the tale, Joseph of Arimathea, the legendary saint of the old Celtic religious house at Glastonbury, prepares the Eucharist; the Holy Child enters the wafer, the hands of Christ unseen give the sacrament, Joseph interprets the Grail as the dish used at the Last Supper, and Galahad dies.

The great contemporary *Parzival*, by Wolfram of Eschenbach (whencesoever derived), runs a course too different from the above romances to require notice here.

Two legends seem to be combined in the romance before us; and Nutt gives very strong reasons to believe that the *History*, infusing the Christian element, is the latter; whilst the Grail 'talismans' (among which the lance became the spear of Longinus) belong to primitive Celtic, pagan, mythology; the cup representing the frequently occurring magical cauldron; probably (according to Rhys) that which Taliessin sang was fetched from Pwyll, Lord of Hades, by Arthur. Hence 'the history of the Legend of the Holy Grail is the history of the gradual transformation of old Celtic folklore into a poem, charged with Christian symbolism and mysticism. This transformation . . . was hastened later by the perception that it was a fitting vehicle for certain moral and spiritual ideas' (Nutt, p. 227). Thus, for Peredur (the Perceval of France) was substituted Galahad, with 'fresh adventures intended to glorify physical chastity,' to which the original hero made no pretensions.

Careful readers may detect some slight vestige of these curious transformations in the poet's *Grail* idyll. But the splendid mystery of Percivale's Vision is all his own.

Tenor, in Music, is the higher description of adult male chest voice, and generally extends from C on the second space of the bass stave to A on the second space of the treble. The tenor clef (a C clef on the fourth line of the stave) is now little used, the music being usually written an octave above its real pitch, on the treble clef. In early church music the tenor part was the melody, plainsong, *canto fermo*, or 'church part.'

Tenos, or Tino, a Greek island in the Archipelago (q.v.), belonging to the Cyclades, lies immediately SE. of Andros. It is 18 miles long, 70 sq. m. in area, and has a pop. of 12,565. The soil is fertile and well tilled. The capital, Tenos, on the south coast, has 2083 inhabitants.

Tenrec (*Centetes*), a genus of Insectivora, represented by one species (*C. ecaudatus*), which is restricted to Madagascar, Bourbon, and Mauritius. It is the largest known insectivore, measuring from 12 to 16 inches in length; and it is probably the most prolific of mammals, since as many as twenty-one young are said to have been brought forth at a birth. The body is squat; there is hardly any tail; the adult males have long canines; the young have strong white spines in lines along the back, but these are afterwards lost.

Tenrec (*Centetes ecaudatus*).

It feeds chiefly on earthworms, and is said to become dormant during the hottest part of the year.

Tent (Lat. *tentus*, 'stretched,' from *tendere*). Tents have been used since very early times as an advance upon cave-dwellings, especially amongst nomadic tribes. The skins of animals, or leaves, or bark formed the earliest coverings, textile fabrics being substituted as civilisation advanced. Bible patriarchs always dwelt in tents, probably much the same as the modern Arab tents, which are large structures, very rude in form and of small height, but covering a considerable area. The covering is felted goat-skins. The Jewish Tabernacle was a large tent, and had a covering of rams'-skins and badgers'-skins (new translation, seal-skins). The Nineveh sculptures show the tent of King Sennacherib, like modern tents supported by ropes. The manufacture of goatskin tents was an established industry in the time of St Paul, who took part in it. The early Greek tents were made of skins, each accommodating two soldiers. Alexander the Great is said to have had a pavilion of extraordinary magnificence. Its roof, one mass of gilded embroidery, was sustained by eight pillars covered with gold. In the centre was the royal throne; and 100 beds could be made up within the temporary edifice. The Roman tent was made of canvas or some such material, supported by two upright posts carrying a ridge pole. Each held ten soldiers with their *decanus* or corporal. In Persia many tribes live entirely in hemispherical felt tents much decorated and with handsome door hangings. Chinese tents are usually of matting, of great size, and often very comfortable. The American Indians' wigwam is a conical tent of bark, mats, or skins on poles; and the so-called wigwams in which the thousand delegates of one of the American political parties sometimes meet, as at Chicago in 1892, are simply enormous tents. The tents of Gypsy tent-dwellers are stretched on rods bent into hoop shape. Like canoeing and caravaning, camping out in tents is a popular way of holidaying for healthy young men not unwilling to rough it a little; see Lowndes, *Gypsy Tents and how to use them* (1890); Macdonell, *Camping Out* (1892).

Except in tropical or very inclement climates tents are not carried by European armies now in any large numbers. Troops are billeted in villages or bivouacked. A few tents for the senior officers, for offices, guards, and hospitals are provided in the equipment of British troops operating in Europe, and in peace manœuvres a sufficient number is provided for all ranks. In India too this provision is always made. The European

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tents generally used are three in number: the *hospital marquee*, dimensions 30 feet long, 15 feet broad, and 15 feet high; sides, 5 feet high; has two poles; weighs in its valise with poles, four large and 180 small pins, and two mallets —512 lb. dry, 660 lb. wet. It accommodates ten sick in beds or sixteen without. The circular *bell-tent* has a diameter at the base of 12½ feet, and is 10 feet high, taking sixteen men, and weighs about 74 lb. dry, 90 wet. The pole is in two pieces like those of the hospital marquee, and forty-two pins with two mallets go with each tent. Both these tents may be floored with wood or tarpaulin, and if the interior is dug out are much more commodious. They are made of sail canvas. The *tente d'abri*, or *shelter tent*, consists of two sheets, two poles, and seven pins; weighs 11 lb. dry, 16 lb. wet; and takes two or three men lying down. Each carries a part of the tent. They were used in the Nile expedition of 1884. In India a large double-roofed square tent is always used, the upper roof projecting so as to form verandas. The sides are vertical and 5 feet high, kept rigid by short poles, and there is one large pole in the centre. Each accommodates sixteen soldiers or twelve sick. The Durbar tents of the Indian government are very large and beautifully made. Those used by the government officials are also much more commodious than ordinary tents.

Tentaculites, a genus of annulated tapering shells, found abundantly in Silurian and Devonian strata. Their affinities are somewhat obscure. By some writers they are regarded as tubicolar annelids, while others refer them with some hesitation to the pteropoda.

Tenterden, a municipal borough and market-town in the Weald of Kent, 13 miles SW. of Ashford and 7½ S. by E. of Headcorn station. The church has a noble Perpendicular tower, built in the 15th century, and associated by legend with the Goodwin Sands (q.v.). Pop. (1851) 3901; (1891) 3429.

Tenterden, CHARLES ABBOTT, BARON, was born a barber's son at Canterbury, 7th October 1762. A foundationer at King's School, Canterbury, of which he was captain at seventeen, he gained an exhibition which enabled him to proceed to Corpus Christi College, Oxford. Here he obtained a scholarship; in 1784 the chancellor's medal for Latin verse, in 1786 for an English essay; graduated in 1785, and soon after became fellow and tutor of his college. Entered at the Middle Temple, he was called to the bar by the Inner Temple in 1796. He joined the Oxford circuit, and, in spite of a husky voice, a heavy face, and timid manners, his energy and knowledge soon brought a large practice. In 1801 he became recorder of Oxford, and next year published his clear and learned treatise on the *Law relative to Merchant Ships and Seamen*. It had the effect of increasing his employment in the more lucrative mercantile causes, so much that in 1807 he returned his income as upwards of £8000. In 1816 he accepted a puisne judgeship in the Court of Common Pleas; and in 1818 he was knighted, and chosen to succeed Lord Ellenborough as Chief-justice of the King's Bench. As a judge his most marked characteristic was his perspicacity and freedom from bias. He was raised to the peerage in 1827. In the House of Lords he strongly opposed the Catholic Relief Bill, and in his last speech he made a vow that if the Reform Bill, that 'appalling bill,' passed, he would never again take his seat as a peer. He fell ill at Bristol, while presiding at the trial of the mayor for misconduct during the Reform riots, and died suddenly, 4th November 1832.

Tenure, a general name for the conditions on which land is held by the persons who occupy and use it. Forms of land tenure are of various kinds; the earliest of them are connected with the occupation of a tract of country by a tribe or village community; with the advance of civilisation individual rights were more precisely defined; under the Roman law land was a thing *in commercio*, to be used and disposed of at the discretion of the owner. The feudal system combined something of the precision of Roman law with the personal tie between lord and vassal as recognised in the customs of the barbarian nations. Rights in land were made the basis of social order; every man rendered definite services to the superior of whom he held. The Norman Conquest brought in a race of expert lawyers who would have carried feudal theory to an oppressive extreme if it had not been for the principles recognised in Magna Charta and afterwards embodied in legislation. All lands in England were, and still are, held of the crown; the actual owner or cultivator of the soil owed suit and service to the king or to some subject lord who held of the king. The Manor (q.v.) was the unit of administration. The tenures recognised by law were of three kinds: (1) Military tenures, such as knight-service, the chief incidents of which were the duty of serving in war, suit of court (attendance in the courts of the superior), aids, reliefs, and primer seizin (money payments on certain occasions), and escheat (reversion of the land to the lord on failure of heirs, &c.). The lord exacted a fine on alienation of the holding; he had the wardship of an infant heir, and as guardian disposed of his hand in marriage. These tenures were extremely burdensome, and the feudal rights of the crown were greatly abused. At the restoration of Charles II. the military tenures were abolished, except only the honorary services of Grand Serjeanty (q.v.). (2) Free socage—the service of freemen who rendered fealty and suit of court, together with some fixed service, such as might be, and always was, commuted for a payment in money. This is the tenure on which freehold lands are still held. (3) Copyhold, the tenure of persons who originally were villeins or villagers holding at the will of the lord, but had gained a more secure position by the custom of the manor, and held copy of the court rolls on which their rights were recorded. Land assigned for the endowment of the church was held 'by divine service' or by the still easier tenure known as *frankalmoign* or free alms. In process of time feudal ideas of social order gave way to commercial ideas; land was regarded merely as a form of property to be used and disposed of at the discretion of its owners. Thus, though tenure still exists in England, it is of comparatively small importance. The distribution and management of land are governed by contract, not by feudal rule. Economists and lawyers hold for the most part that 'free trade in land' is justified by its results; Sir H. Maine points to the rapid settlement of North America as a sample of what can be done by men stimulated by the hope of acquiring property. Socialists and land-nationalisers hold that property in land is the cause of an unjust distribution of wealth; they would take all land (with or without compensation to existing owners) into the hands of the community, and they would permit no tenure except on such terms as the community might consider to be advantageous.

In Scotland, as in England, the feudal system was long established. Subinfeudation (grant of land by a free vassal to another person to hold under himself) has been forbidden in England since 1290, because it was found to prejudice the rights of superior lords; but the practice was permitted

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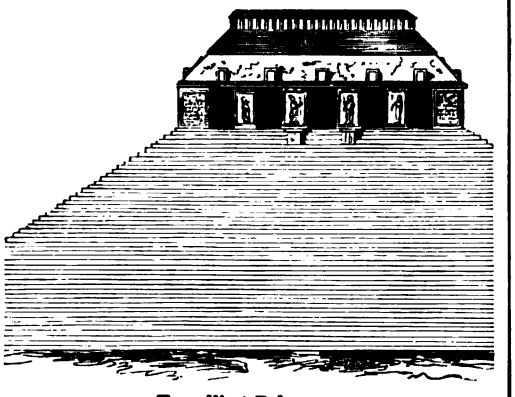
in Scotland. Modern Scots law distinguishes between the property or *dominium utile* of land and the superiority or *dominium directum*, the chief incident of which is the feu-duty paid by the vassal. On alienation of the land or death of the vassal forms were used implying consent or recognition by the superior, and casualties or additional payments were made on such occasions. These forms and the endless creation of subordinate feudal rights tended to complicate the whole system of conveyancing; but the law has been greatly simplified by recent statutes (see CONVEYANCING). In Ireland the English law displaced and abolished the customs of the Celtic tribes; but the country never was thoroughly feudalised, and the peasant farmers have always been hostile to English notions of free trade in land (see LAND LAWS). In the United States (except Louisiana) and in those British colonies which have been formed in countries previously unsettled the English law of tenure forms the historical basis of the local law; but in a new country there are of course neither lords nor vassals, and the phrases of the feudal law only serve to remind us that land is and always must be held under some governing authority, and on such terms as legislators may impose upon the owners and cultivators.

For the early history of tenure, see Coulanges, *Origin of Property in Land* (trans. by Ashley); Elton, *Origins of English History*; Skene, *Celtic Scotland*; and Richey, *Irish Land Laws*. For curious tenures on quaint and merely nominal conditions, such as bearing a silver jug and basin as often as the king might visit the lands granted, see Thomas Blount, *Ancient and Jocular Tenures* (1679; new ed. 1815). For a comparison of modern forms of tenure, Cliffe Leslie, *Land Systems*, and the Cobden Club Essays may be mentioned. See also the articles BLANCH, CHARTER, COPYHOLD, FEU, FEUDALISM, FREEHOLD, &c.

Teocalli (Mexican, lit. 'house of a god'), the name given to the temples of the aborigines of Mexico, of which many still remain in a more or less perfect state. They were built in the form of four-sided pyramids, and consisted for the most part of two, three, or more stories or terraces, with the temple, properly so called, placed on a platform on the summit. In some cases they were natural hills, faced with layers of stone, adobe, plaster, &c. The largest and most celebrated is the pyramid of Cholula, measuring 1440



Teocalli at Palenque.

feet each way, and 177 in height; it is much defaced, and the temple on its summit has been removed. The teocallis in Yucatan are in far better preservation; they are not generally built in terraces, but rise at an angle of 45° to the level of the platform, with an unbroken series of steps from base to summit. The temples on their summit are sometimes ornamented with bas-reliefs and hieroglyphic tablets. The preceding illustration gives the elevation of a large teocalli of this kind at Palenque (q.v.). Not unlike the teocallis are the palaces of the Aztec kings or chiefs. See MEXICO.

Tepic, a town of Mexico, in the state of Jalisco, in a fertile upland valley, 30 miles E. by S. of San Blas. Its 25,000 inhabitants are largely employed in the numerous neighbouring mines.

Teplitz, a watering-place of Bohemia, is situated in a beautiful valley near the Erzgebirge, 20 miles NW. of Leitmeritz by rail. The baths are supplied from about a dozen hot alkalo-saline springs, are taken exceedingly hot, and have great virtue in restoring persons afflicted with gout, rheumatism, &c. One of the springs is used also for drinking. Pop. of Teplitz, with Schönau, 16,750. Some 7000 persons use the baths yearly, besides a much larger number of mere visitors.

Teramo (anc. *Interamna*), a town of Italy, the capital of a province (see Vol. VI. p. 240), on the Tordino, 84 miles S. of Ancona by a short branch-line. Its cathedral (1355) has been modernised. Pop. 8650.

Teraphim, a Hebrew word of uncertain derivation, denoting a certain kind of images, idols, or household gods, of a human figure, associated with divination, and commonly used in the popular worship. The *gods* which Rachel stole are called teraphim, and Saul's daughter Michel placed a teraph in David's bed to conceal his flight. This veneration for teraphim flourished side by side with the worship of Jehovah, though condemned by the prophets. The word in the Authorised Version is sometimes simply transcribed, sometimes variously rendered by *images, idols, idolatry.* See IDOLATRY.

Teratology, the study of malformations or abnormal growths, animal or vegetable. Those of the animal kingdom are treated at MONSTROSITY, DEFORMITIES, CLUB-FOOT, DWARF, HARELIP, &c. Those of the vegetable world form part of the subject of Vegetable Pathology, which deals with the diseases of plants (see that sub-heading under PLANTS, special articles such as ANBURY, &c.), and with excrescences caused by animals and parasites (see BEDEGUAR, GALL-FLY, GALLS, &c.; also BORING ANIMALS). Under this head come also abnormal forms like four-leaved clover, &c., as well as changes in the form of plants brought about by the skill of gardeners and agriculturists—such as the bulbous modification of the roots of turnips, the development of such a growth as cauliflower, the production of double-flowering plants, and the metamorphosis of organs. See BOTANY, CULTIVATED PLANTS, FLOWER, LEAF, HYBRID, MORPHOLOGY, and VARIATION; the articles on flowers that have been so developed—COCKSCOMB, DAHLIA, ROSE, &c.; the handbooks of morphological and physiological botany, but especially Masters, *Vegetable Teratology* (Ray Society, 1869), Penzig, *Pflanzen-teratologie* (1890), and Dareste, *Récherches sur la Production artificielle des Monstrosités* (2d ed. 1891).

Terburg, GERARD, painter, was born at Zwolle in 1608, studied first under his father, Gerard (1584–1662), and afterwards visited Italy and England, was at Münster during the congress of 1648, and later at Madrid. On his return he settled at Deventer, where he became burgomaster, and died 8th December 1681. The elegant life of his time, with its superfine manners and splendid costume, found in Terburg an admirable painter. The central figure in many of his

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pictures is a fair-haired young lady in white satin; delicacy, grace, and humour, and marvellous mastery of technique in draperies inform all his work. His most famous picture is a small work on copper containing portraits of the sixty-nine plenipotentiaries who drew up the Treaty of Westphalia. See Michel, *Terburg et sa famille* (1888).

Terce. See BREVIARY; and for terce, the widow's portion, see HUSBAND AND WIFE.

Terceira. See AZORES.

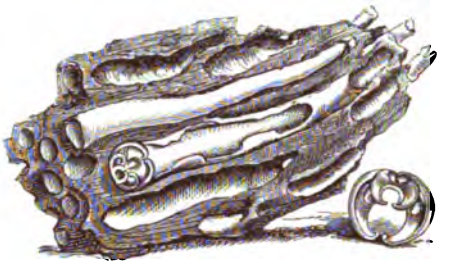
Terebinth (Gr. *terebinthos*), another name for the Turpentine-tree, described at PISTACIA, the genus to which it belongs, and for the turpentine obtained from it. Terebinthaceæ is a term that has sometimes been used either for a part or for the whole of the Anacardiaceæ, to which belong the turpentine-tree, pistachio-nut, mango, sumach, Japan lacquer (Rhus), &c.

Terebratula, a genus of deep-sea Brachiopods, which, from the resemblance of the ventral valve of their shell to a Grecian lamp in form, are popularly termed Lamp-shells. The shell is symmetrical inequivalve, smooth to the naked eye, but when examined with a lens is seen to be minutely punctated. The ventral valve is the larger, the beak of which is produced and truncated at the apex, which is perforated. The animal is attached to the shell by a bundle of muscular fibres termed the peduncle,

Terebratula:
a, valve with the spiral arms; *b*, valve with arms removed.

which passes through the perforated apex of the ventral valve. There are only two British species. Fossil representatives appear at the conclusion of the Silurian period. Although termed deep-sea forms, Jeffreys considered that 'the nature of the sea-bottom, more than the depth of water, determines the limit of their habitability.'

Teredo, a genus of Lamellibranchiate molluscs of the family Teredinidæ (Gray), commonly known as shipworms, from the fact that they perforate and live in ships' timber, the woodwork of harbours, &c., causing considerable damage. They are of an elongate and worm-like form, measuring from a few inches to 3 feet in length. Two small valves form the bivalve shell situated at the anterior part of the body, in close proximity with the principal organs, which form a visceral mass. At the opposite end a pair of shelly paddles or 'pallets,' which vary in different species, close the burrow at the will of the animal. Their perforations are made usually in the direction of the grain of the timber, and the burrows are always distinct from one another. The burrow is lined with a calcareous substance secreted by the mollusc. The teredo does not feed upon the wood which it excavates. Whether the excavation is caused by the sucker-like application of the foot or the rasping action of the shell has not yet been satisfactorily demonstrated. The teredines reproduce themselves in large numbers, and grow with great rapidity. Extreme cold is fatal to them. As a protection from the ravages of these molluscs timber is often driven full of short broad-headed nails, which rust and form a coating which they do not penetrate. The teredo is often said to have been introduced into Europe from warmer climates,



Common Shipworm (*Teredo navalis*).

but facts do not bear out the statement. Tropical species will not live in European seas, and *vice versâ*. *T. norvegica*, which occurs in the North Atlantic, is found in the bordering countries in a fossil condition. The teredines were well known to the ancients, and are mentioned by Theophrastus, Pliny, Ovid, &c.

Terek, a stream of the Caucasus, rising near lofty Mount Kasbek, and flowing 350 miles, generally north-east, until, at Kisliar, it divides into several branches, which form a delta 70 miles broad, and finally falls into the Caspian Sea.

Terence. Publius Terentius Afer, Roman comic poet, was born at Carthage about 185 B.C., in the interval between the second and third Punic wars. He was presumably a Phœnician by race; and he became, by birth or purchase, the slave of the Roman senator P. Terentius Lucanus, who brought him to Rome, and, out of regard to his handsome person and unusual talents, educated him highly, and finally manumitted him. On his manumission he assumed, of course, his patron's *nomen*, Terentius. His first play was the *Andria*, acted in 166 B.C. Its success was immediate, and introduced its author to the most refined society of Rome, where his engaging address and accomplishments made him a great favourite. His chief patrons were Lælius and the younger Scipio, after living with whom in great intimacy for some years in Rome he went to Greece, doubtless with the view of becoming personally familiar with Greek life and manners; and there he seems to have died in 159 B.C., only about twenty-five years old. Six comedies are extant under the name of Terence, which are perhaps all he produced—viz. *Andria*, exhibited in 166 at the Megalensian games, an adaptation of Menander's *Andria* with additions from the same poet's *Perinthia;* the bright and lively *Eunuchus*, from Menander's *Eunouchos* and some parts of his *Kolax; Heauton Timoroumenos* ('the self-tormentor'), after Menander's play of the same title, without the use of another play, a comedy of intrigue, with a somewhat extravagant plot, and but little attempt at delineation of character; *Phormio*, so called from the parasite in the play, the original by Apollodoros of Karystos being entitled *Epidikazomenos*, a bright merry comedy, with an interesting plot and careful character-painting; *Hecyra*, the mother-in-law, his least successful piece, the plot poor and uninteresting, the characters peculiar; and *Adelphi*, from Menander's *Adelphoi*, with the addition of a scene from the beginning of Diphilos' *Synapothnēskontes*, an effective comedy, with simple and harmonious plot, and careful delineation of character—the two old men, the easy bachelor about town and the embarrassed country landlord, forming an inimitable contrast. Thus, as we have seen,

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Terence has no claim to creative originality, his plays, Greek in origin and Greek in scene, being directly based on Menander, who, indeed, is best known to us through the works of his copyist. Cæsar, in a well-known epigram, addresses him 'O dimidiate Menander.' A foreigner in Rome and a total stranger to Greece when he wrote, he gave the still somewhat uncouth Romans a picture of the grace, elegance, and refinement of Greek manners; and he wrote in singularly pure and perfect Latin —ranked by Munro in the very highest level with Cicero, Cæsar, and Lucretius. His style, indeed, is pure almost to being immaculate, and, though inferior to Plautus in comic power, in mastery over passion, in vigour and variety, he is more than his match in consistency of plot and character, in tenderness, in wit, in effective dialogue, and in metrical skill. He employs almost exclusively iambic and trochaic metres. He admitted and defended from the example of the older Roman poets the practice of *contaminatio*—constructing one Latin play by uniting scenes from several separate Greek ones. He was a true artist. In conjunction with Plautus, Terence, on the revival of letters, was studied as a model by the most accomplished play-writers. The *Eunuchus* is reflected in the *Bellamira* of Sir Charles Sedley and *Le Muet* of Brueys; the *Adelphi* in Molière's *École des Maris* and Baron's *L'École des Pères;* and the *Phormio* in Molière's *Les Fourberies de Scapin.* His plays have been translated into most of the European languages. Notable editions of his works are those of Bentley (1726), Davies, Parry, Fleckeisen (1857), Wagner (Lond. 1869), Umpfenbach (Berlin, 1870, the standard critical edition), and Dziatzko (Leip. 1884).

Teresa, or THERESA, ST, one of the most remarkable of the women saints of the modern Roman calendar, was born at Avila, in Old Castile, March 28, 1515, of the noble house of Cepeda. Even as a child she was remarkable for piety of a most enthusiastic kind; and, educated in a convent in her native city, she entered a convent of the Carmelite order there in 1534. In this convent she continued to reside for nearly thirty years, but it was not till about the year 1539 that her constitution became strong enough to permit her to follow, even in an imperfect way, the observances of conventual life. Her own account of her mental and spiritual condition is interesting from the first; but it was not till 1555 that a change of heart and of purpose came, which was as complete and decisive as her former condition had been purposeless or fluctuating. After a time her religious exercises reached a most extraordinary degree of asceticism. Her prayers were almost continual, and she was reported to be favoured with visions, ecstasies, and other supernatural visitations. The fame of her sanctity spread not only throughout Spain, but into almost every part of the church. By some the reality of the reported supernatural favours which were ascribed to her was called in question; and there were even some who threatened to invoke the rigorous investigation of the Holy Office; but the popular voice was freely accorded to her, and the authority of St Francis Borgia, St Peter of Alcantara, and other influential churchmen eventually disarmed the opposition. The most notable and permanent fruit of the enthusiastic spirituality of Teresa is the reform of the Carmelite order, of which she became the instrument. She commenced this work in concert with a few zealous members of her own sisterhood in the convent at Avila, where she had resided from the date of her profession; but after a time she obtained permission from the holy see to remove with her little community to a humble house in the same city, where she re-established in its full rigour the ancient Carmelite rule, as approved by Innocent IV. in 1247, with some additional observances introduced by herself. This new convent of St Joseph's was established in 1562, in which year she assumed the name of Teresa de Jesus; and in 1565 she obtained from the pope, Pius IV., a formal approval for the rule as modified by her. For two years Teresa lived in great privacy and quiet in her convent; but in 1567 the general of the Carmelite order, F. Rubeo, was so struck, during his visitation of the convents at Avila, with the condition of that over which Teresa presided that he urged upon her the duty of extending throughout the order the reforms thus successfully initiated. Teresa entered upon the work with great energy, and although she met with much opposition, nevertheless succeeded in carrying out her reforms. In 1579 the Carmelites of the stricter observance established by Teresa were released from the jurisdiction of the old superiors, and united into a distinct association, with a separate head and a distinct organisation, which was approved in 1580 by Pope Gregory XIII. Under this new constitution the association flourished and extended; and within her own lifetime no fewer than seventeen convents of women and sixteen of men accepted the reforms which she had originated. Teresa died at Alba, October 4, 1582, in her sixty-eighth year. She was canonised by Gregory XV. in 1622, her feast being fixed on the 15th October.

She left a number of works, which have at all times maintained a high reputation among a large section of her own church; their merits are also acknowledged by non-Catholic writers. They consist of ascetical and mystical treatises, instructions in the conventual life, meditations, besides a large number of letters which possess remarkable literary merit. The best-known treatises are her autobiography, *The Way of Perfection*, *The Book of the Foundations* (trans. by Dalton, 1853), and *The Interior Castle* (trans. by Dalton, 1852). Her works in the original Spanish fill two folio volumes (Salamanca, 1587), and they have been in whole or in part translated into almost every European language. Migne issued a French edition in 4 vols. (1840-46). Her life occupies nearly an entire volume of the *Acta Sanctorum;* and several biographies have been written in Spanish (Ribera's appeared in 1690), French, Italian, German—the best-known English ones being that by Canon Dalton (1851), one edited by Cardinal Manning (1865), one by Miss Trench (1875), and the *Life and Letters* by Father Coleridge, S.J. (3 vols. 1881-88). See, too, the *Quarterly Review* for October 1883.

Terlizzi, a town of Italy, 22 miles W. of Bari. Pop. 20,442.

Term, a day fixed by law and usage for payment of rent, and for the commencement and termination of the contract between landlord and tenant; also the period between two terms. In England and Ireland the year is divided into four quarters or terms. These are Lady Day, March 25; Midsummer Day, June 24; Michaelmas Day, September 29; and Christmas Day, December 25. In Scotland the terms as between landlord and tenant are divided into legal and conventional terms. There are two terms recognised by common law—viz. Whitsunday, May 15, and Martinmas, November 11; while other two conventional terms subdivide these—viz. Candlemas, February 2, and Lammas, August 1. Removal terms and the terms by which domestic servants are engaged are the 28th May and 28th November. The Michaelmas term is the most important in England, whereas in Scotland it is Whitsunday. There is also a subdivision of the year into Law-terms; since the passing of the Judicature Acts the traditional terms are superseded by the times fixed for sittings of the courts by statute, but for some purposes we still distinguish Hilary, Easter, Trinity, and Michaelmas terms. At the English universities there are nominally four terms in the year, but

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usage has established three working terms of about nine weeks each.

Termini, a seaport on the north coast of Sicily, 23 miles ESE. of Palermo by rail. Pop. 22,733. The industries are tunny and sardine fishing. The ancient *Thermæ Himerenses* here was founded by the Carthaginians in 408 B.C., after the destruction of the Greek city of Himera. Under the Roman rule it flourished through its baths. Of these some fragments still exist, as well as of a theatre, an aqueduct, &c.

Terminus, a Roman divinity, supposed to preside over public and private boundaries. Originally he appears to have been the same as Jupiter himself, but gradually he was recognised as a separate and distinct god.

Termites (*Termitidæ*), a family of insects in the order Corrodentia, or, according to some systems, Pseudo-Neuroptera. They are often called 'white ants,' but ants are Hymenopterous insects, and do not occur before Tertiary times, whereas the Termites seem to have lived from Carboniferous ages onwards. Yet, like the ants, the termites are

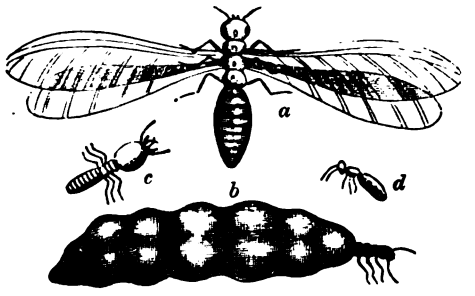

Fig. 1.
a, perfect male termite; *b*, female distended with eggs; *c*, soldier; *d*, worker.

social insects, living in colonies and building 'nests' or 'hills.' They are widely distributed in tropical countries, but they also occur in the temperate parts of North and South America, and a few have established themselves in Europe. As their food consists for the most part of wood, especially in a state of incipient decay, they help many trees to their fall, and they are destructive pests in human dwellings. As they form earthen tunnels up the stems and branches of the trees which they attack, and as the rains wash down these constructions, it seems just, as Henry Drummond points out, to recognise that termites, like earthworms, may help in making the fruitful soil.

The termite society consists for the most part of wingless, sexually immature individuals, children, potentially of both sexes, which do not grow up. Besides these workers there is a less numerous caste of large-headed, strong-jawed soldiers. 'They stand,' Drummond says, 'or promenade about as sentries, at the mouths of the tunnels. When danger threatens, in shape of true ants, the soldier termite advances to the fight. With a few sweeps of its scythe-like jaws it clears the ground, and while the attacking party is carrying off its dead the builders, unconscious of the fray, quietly continue their work.' The workers collect food, form burrows and tunnels, build 'hills,' and care for the males, females, eggs, and larvæ. The males and females have wings, which the latter lose after impregnation. Then, indeed, the female or queen undergoes a remarkable change, becoming enormously distended with eggs and sometimes attaining a length of 2 to 5 inches or more—'a large cylindrical package, in shape like a sausage, and as white as a bolster.' As only the abdomen swells, the resulting disproportion between anterior and posterior parts is very striking. The queen is extremely prolific, having been known to lay 60 eggs in a minute, or about 80,000 eggs in a day. In the royal chamber a male is also kept. It is hardly necessary to say that the queen could not leave if she would. But to understand this imprisonment we must notice that in spring the young winged males and females leave the nest in a swarm, after which pairing takes place; the survivors becoming the imprisoned 'rulers' and parents of new colonies.

But Fritz Müller has shown that besides the winged males and females there are (in at least many cases) wingless males and females which never leave the termitary in which they are born, being kept as complementary or reserve reproductive members, useful should not a winged royal pair be forthcoming. Sometimes this casualty occurs, and then the wingless pairs become parents. The complementary kings die before winter; their mates live on, widowed, but still maternal, till at least another summer. Müller points out that, though the production and parentage of wingless males and females involves less mortality, the winged males and females probably cross with those from other nests, thus securing the advantages of cross-fertilisation. The workers are diligent in tending the king and queen, in removing the laid eggs, and in feeding the larvæ.

In general appearance and size a wingless termite is ant-like, but the winged forms are much larger and flatter, and their wings are quite different. The workers have large broad heads and strong jaws adapted for gnawing; the soldiers have still larger heads and longer jaws. Besides the jaws and the two pairs of maxillæ the head bears a pair of beaded antennæ, two eyes, and two ocelli, but the workers and soldiers are blind. The thorax has the usual three segments, and bears simple legs; the abdomen consists of nine segments.

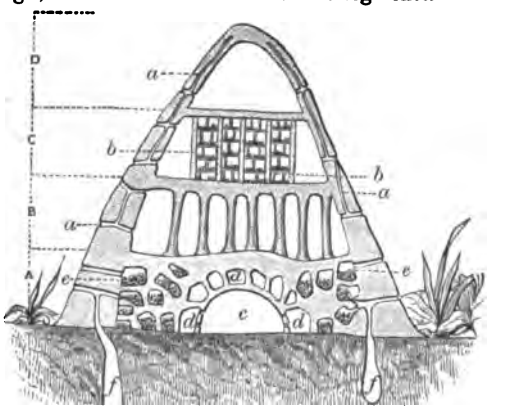

Fig. 2.—Diagrammatic section of a Termite's Nest (after Houssay):
In the walls there are winding passages, *a*; uppermost is a well-aired empty attic, D; the next story, C, is a nursery where the young termites are hatched on shelves, *b*; the next is a hall, B, supported by pillars; beneath this is a royal chamber, *c*, in which the king and queen are imprisoned; around this are the chambers of worker-termites, *d*, and some store-chambers, *e*; excavated in the ground are holes, *f*, out of which the material used in making the termitary was dug.

The most remarkable termitaries are those of *Termes bellicosus*, abundant on the west coast of Africa. They are sugar-loaf-like in shape, 10 to 20 feet in height, and, though built of cemented particles of earth, are strong enough to bear a man's weight. Internally, as the figure shows, there are

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several stories and many chambers, some for the workers, one for the king and queen, others for the eggs and young, others for storing supplies of compacted minced wood. But the termites do not all build such gigantic nests; for some build their homes on the branches of trees and apparently out of masticated woody material.

In Africa *Termes bellicosus* and *T. arborum* are common species; in North America *T. flavipes* is very common. A few species—*T. lucifugus*, *T. flavicollis*, and *T. flavipes*—all probably introduced—occur in Europe. Besides Termes there are other genera, such as Eutermes, Calotermes, and Anoplotermes.

The termites seem to be of use in destroying decaying wood and in loosening the soil. They also afford food for ant-eaters and other insectivorous mammals and for birds. But to dwellers in warm countries they are pests, destroying the timbers of houses and all sorts of wooden furniture. Effecting entrance from underground, they hollow out the interior, leaving only a deceptive shell, which at length collapses. Even in Europe *T. lucifugus* has proved very destructive in some parts of France, notably in the navy-yard of Rochefort. Yet to the naturalist their social life, their reproductive relations, and their architectural instincts are most interesting marvels demanding further research.

See H. A. Hagen, *Monographie der Termitiden* in *Linnæa Entomologica* (vols. x.-xiv. 1855-59); Ch. Lespès, *Recherches sur l'Organisation et les Mœurs du Termite lucifuge* (Ann. Sci. Nat. 4th series, vol. v. 1856); Fr. Müller, *Beiträge zur Kenntniss der Termiten* in *Jenaische Zeitschr. f. Naturwiss.* (vols. vii.-ix. 1873-75); Smeathman, *Some Account of the Termites which are found in Africa*, &c. (Trans. Roy. Soc. 1781); Grassi, *Memoria sulla Società dei Termiti* (Accad. Lincei, Roma, 1892).

Tern, the name applied to several genera of birds of the Gull family (Laridæ), by some made into a sub-family (Sterninæ); they have the bill as long as or longer than the head, nearly straight, compressed, slender, tapering; the wings long and pointed; the tail usually long and more or less forked, sometimes graduated; the legs and feet short and small. In plumage the terns resemble the gulls, but are usually smaller. From this, and from their forked tail, they are often called Sea-swallows, though their flight is more like that of a gull. They are constantly on the wing, swooping on small fishes and other small animals in the water, or catching insects over the land. The species are numerous, and found all over the world,

Common Tern (*Sterna fluviatilis*).

frequenting fresh as well as salt water. Those which occur in the north migrate south in winter. Some species have a very wide range. Thus, the Common Tern (*Sterna fluviatilis*), abundant on the more southern coasts of Britain, is also found on the coasts of Europe, western Asia, western Africa as far as Accra, and eastern North America. In Cashmere, Tibet, and south Siberia it is replaced by a nearly allied species, *S. tibetana*, which visits Ceylon and South Africa in winter. Terns make little or no nest, laying their spotted eggs on sand or shingle, from which they are often with difficulty distinguished. Some, however, breed in marshes, and some build on trees and bushes, as the Noddy (*Anous stolidus*). This bird derives its name from the ease with which it is caught when it alights on ships to rest; it has a graduated tail, and is sooty-brown, with a gray cap. It is found in all tropical waters, and has even occurred on the Irish coast. The Sooty Tern (*S. fuliginosa*) breeds in vast numbers on Ascension Island, where it is known as the 'Wideawake.'

Ternate. See MOLUCCAS.

Terni, a cathedral city of Central Italy, between the two arms of the Nera, 70 miles NNE. of Rome by rail. Pop. 9415. About two miles off is the famous cataract of Velino, 500 feet high, celebrated by Byron in his *Childe Harold*. Terni is the ancient *Interamna Umbrica*, perhaps the birthplace of Tacitus.

Ternstrœmiaceæ, a natural order of polypetalous plants, consisting of trees and shrubs, natives of warm and temperate countries. About 150 species are known. They are most abundant in South America; a few are found in North America; some in India, China, and the Indian Archipelago. The leaves are alternate, leathery, in many species evergreen, generally undivided, sometimes dotted. This order is very important as containing the Tea-shrubs. It is also interesting because of the great beauty both of the foliage and flowers of many of the species, of which the genus Camellia affords the best-known examples. See TEA, CAMELLIA, and GORDONIA. The genus Ternstrœmia was named in 1781 from the Swedish naturalist Ternström.

Terpsichoré (Gr., 'delighting in the dance'), one of the nine Muses (q.v.), presided over choral song and dancing.

Terraces, in Geology, comparatively level strips of land near the sea, lakes, or rivers, with a sharp descent at the edge towards the water, showing an ancient water-level. See BEACHES (RAISED), GLENROY, RIVER, LAKE, VALLEY.

Terracina, a coast town of Central Italy, 60 miles SE. of Rome. It has a cathedral on the site of a heathen temple, and on the summit of a precipice overlooking the town the ruins of a palace of king Theodoric. Pop. 6294. The Roman *Tarracina* was originally a Volscian town (*Anxur*), and down to the fall of the empire was an important station on the Appian Way.

Terra-cotta, an Italian term for pottery or earthenware ('baked clay'). The name is not applied in England to ordinary pottery vessels with thin walls, but is confined to objects of the nature of bricks, and usually of comparatively large size and unglazed. Statues, statuettes, bas-reliefs, and architectural members such as columns, cornices, friezes, consoles, and the like made of burnt clay are said to be executed in terra-cotta whether they are ancient or modern. But the term is not confined to articles of a decorative character. The colour of terra-cotta is either buff yellow, or red, the former being the more common. Many masterpieces of ancient Greek and Roman sculpture are executed in this material, and a considerable number of works in burnt clay, by Italian artists who lived in the middle age and early Renaissance periods, are also exquisite productions. Illustrations of a number of these ancient works of art in terra-cotta will be found in the published

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catalogues of the British Museum and the South Kensington Museum. Architectural ornaments of a very effective kind were also executed in this material in ancient times.

Distinguished modern sculptors sometimes produce works in terra-cotta, and for the last thirty or forty years it has been increasingly employed, either partly or wholly, for the fronts and other portions of important buildings (see DOULTON, TINWORTH). The new Natural History Museum at South Kensington and a few other buildings in its neighbourhood, as well as elsewhere in London, are examples. Terra-cotta is peculiarly well suited for architectural work in towns like the metropolis where stone too readily decays, or in cities to which stone has to be brought from a long distance. Berlin is thus remotely situated, and in that city many large and highly ornate modern buildings are executed in this material. See C. T. Davis, *Manufacture of Brick, Terra Cotta, &c.* (new ed. 1889).

Terra del Fuego. See TIERRA DEL FUEGO.

Terra di Lavoro, the old name for the province of Caserta (q.v.).

Terra-firma, a term frequently employed to denote continental land as distinguished from islands. But it was at one time more specially applied to all the mainland of Italy which acknowledged the supremacy of Venice, and to the northern part of South America. Colloquially, the phrase *terra-firma* is applied (but erroneously) to land as distinguished from water.

Terra Japonica. See CATECHU.

Terranova, a seaport on the south coast of Sicily, 60 miles W. of Syracuse. Pop. 16,440.

Terrapin, the popular name of many species of fresh-water and tidal-water tortoises of the family Emydidæ, natives of tropical and the warmer temperate countries. About twenty fresh-water species are found in the United States. But the terrapin *par excellence* is the *Malacoclemmys palustris*, the diamond-back salt-water terrapin, highly prized as a delicacy for the table. It is caught in salt marshes along the coast from New England to Texas, the finest being, however, those of the Massachusetts and the northern coasts. At their best terrapin vary in price from $10 to $55 a dozen, according to size and quality. Another species is *M. geographicus*, with peculiar map-like markings; and there are several species of Pseudemys. 'Brer Tarrypin' is an intelligent and genial interlocutor in many of the beast stories of *Uncle Remus*. See TORTOISE.

Terra Rossa, name given to a ferruginous red earth which is extensively developed in the limestone districts of south-eastern Europe, especially in Istria and Dalmatia. See RED EARTH.

Terre Haute (*Terre* pron. *Ter-re*), capital of Vigo county, Indiana, on the river Wabash (crossed here by three bridges), 72 miles by rail WSW. of Indianapolis and 178 S. of Chicago. It is regularly built on a plateau some 60 feet above the river, and, being within a dozen miles of the great block-coal mines of Clay county, contains numerous foundries, rolling and other mills, and factories. Its public institutions include the state normal school, a college, a polytechnic and other institutes, an orphans' home, &c. Pop. (1870) 16,103; (1880) 26,042; (1890) 30,217.

Terrestrial Magnetism, &c. See MAGNETISM, p. 801, and TEMPERATURE.

Terrier, a name originally applied to any breed of dog used to burrow underground, but now applied to any small dog. Terriers may be divided into three classes: those able to follow their game into its earth, those kept for hunting above-ground, and those kept merely as companions. Among terriers proper the Fox-terrier (q.v.) holds the position of greatest popularity. The Scotch terrier, though long familiar in Scotland, only became generally known about 1870, but is spreading so rapidly that it threatens even the popularity of the fox-terrier. The Scotch terrier is identical with the breed often erroneously alluded to as the

Scotch Terrier, 'Rascal.'

old or working Skye terrier. He is a small, compact dog, short in the leg; coat short, hard, and dense; ears erect; and with a keen, bright expression. In character he is generally alert and active, and makes a splendid companion. The third variety used for going to ground is the Dandie Dinmont, called after the character in Scott's novel of *Guy Mannering*, a character founded on Mr Davison, a well-known Border farmer, who was one of the founders of the breed. The Dandie is a low and powerful dog, very courageous, a quality probably gained by an admixture of bulldog blood, but headstrong and difficult to keep under control. Dandies are divided into 'peppers' and 'mustards'—i.e. those coloured slate-blue and those of a light yellow. The coat is rather longer than the Scotch terrier, but not so hard.

Among terriers kept for hunting above-ground the most popular is the Irish terrier, a dog larger and considerably leggier than the fox-terrier, but built on the same lines. The coat is like the Scotch terrier's, but a light red in colour. The ears used always to be cut to a fine point, standing erect, but are now allowed to fall over in their natural shape. The Bedlington (q.v.) is popular in the north of England; the Bull-terrier (see BULLDOG) also makes a good sporting dog, but is kept mainly as a companion. The Airedale is growing in popularity, but its large size (some specimens weigh 60 lb.) unfits it for any proper terrier work. It somewhat resembles an overgrown blue Bedlington, but lacks the same courage. Among terriers kept as companions the Skye (q.v.) is probably the most common. The Black-and-tan terrier, though a breed of great antiquity, is fast being supplanted by the white English terrier. Both breeds are identical in shape, and resemble a light and elegant bull-terrier. The Toy terrier is a cross from the black-and-tan, as is the Yorkshire terrier. Both varieties are fit only for house-dogs, and are not true terriers.

Territory. See UNITED STATES.

Terror, REIGN OF. See DANTON, ROBESPIERRE.

Terry, ELLEN (Mrs Charles Kelly), the leading English actress of the day, was born at

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Coventry, on 27th February 1843. She made her first appearance on the stage when only eight years old, playing Mamilius in *The Winter's Tale* at the Princess's Theatre, under the management of Charles Kean. In 1858 she acted the part of Arthur in *King John*, and in 1863 made her debut as a regular performer, playing Gertrude in *The Little Treasure* at the Haymarket. From 1864 to 1874 she practically retired from the stage, her only notable appearances being at the Queen's Theatre for a few months in 1867. In 1875 she made a great success in Portia at the old Prince of Wales's Theatre, where she remained for some time under the Bancrofts, playing in *Money*, *The Lady of Lyons*, *Masks and Faces*, and *Ours*. In 1876 she joined the Court Theatre, where her most notable character was Olivia, in Mr Wills's play of that name. On 30th December 1878 she first appeared at the Lyceum in conjunction with Mr Irving (q.v.), with whose brilliant successes her name is inseparably connected. The distinctive feature of Miss Terry's acting is womanliness, and the grace of all her movements and attitudes, the expressiveness of her face, and the simple truth and directness of her speech give all her impersonations a singular charm. Among her best characters are Beatrice, Portia, Ophelia, Olivia, Margaret, Henrietta Maria, and Nance Oldfield.

Terschelling, one of the chain of islands to the north of Holland. It consists of fertile arable and meadow lands, is protected on the south by large dykes, and in other parts by dunes, which are carefully preserved. Area, about 45 sq. m.

Tertian Fever. See AGUE.

Tertiaries, a name given by church writers to a class in the Roman Catholic Church, who, without entering into the seclusion of a monastery, aspire to practise in ordinary life all the substantial obligations of the scheme of virtue laid down in the Gospel. It was under St Francis and the mendicant orders generally that the institute of Tertiaries reached its full development (see FRANCISCANS). Similar lay associations were organised in connection with the Dominican, Carmelite, and Augustinian, as well as with certain of the more modern orders; and a brotherhood of the same character had already been formed by the Templars. The institute of Tertiaries, properly so called, is quite distinct from that of the lay 'confraternities' which exist in connection with the several orders, and the objects of which are very similar.

Tertiary, or CAINOZOIC, the term applied in the science of Geology (q.v.) to all the strata of the earth's crust above the Cretaceous Rocks, with the exception of those superficial beds which have recently been raised to a distinct group, under the title of the Quaternary or Post-tertiary. The Tertiary systems include Eocene, Oligocene, Miocene, and Pliocene.

Tertullianus, QUINTUS SEPTIMIUS FLORENS, a great theologian of the Western Church, was born of heathen parents at Carthage about 160. His father was a Roman centurion under the proconsul of Africa. The details of his life are little known, but the strongly marked character of the man comes out in every page of his numerous writings. He had a liberal education, and shows extensive acquaintance with poetry, history, and law, and considerable knowledge of philosophy and science, though he calls the philosophers 'the patriarchs of heretics' and the learning of secular literature 'folly with God.' He speaks of the delight he once had in the indecent profanities of the public plays, and confesses that he had fallen into the greatest sins. He nowhere says much about his personal religion, but calls himself 'a sinner of all brands, and fit only for penitence, and asks his readers to remember in their prayers Tertullian the sinner.' He had sufficient command of Greek to write in that language his earliest treatises, all of which are lost. Jerome mentions that he was a presbyter of the Catholic Church, whether at Rome or Carthage is unknown. Tertullian himself speaks of his having lived at Rome. Eusebius says 'he was accurately acquainted with the Roman laws, and one of the most distinguished men in Rome.' It is possible that before his conversion he had practised there as an advocate or rhetorician. He did not become a Christian till about 190, and he has not recorded the history of his conversion. That he was married is shown by his two books *Ad Uxorem*, in which he argues against second marriages. Some time between 199 and 203 his opposition to the spirit of worldliness in the church culminated in his becoming a leader of the Montanist sect. According to Jerome, this was owing to 'the envy and insults of the clergy of the Roman Church,' but the chief causes were doubtless the uncompromising character of his natural disposition, and his repugnance to the laxity of the Roman clergy in their reception of the *Lapsi*, and very probably the favour shown to the Patripassian heresy by the Roman bishops Zephyrinus and Callistus. He died between 220 and 240, 'in decrepit old age' (Jerome). Augustine says that he at last withdrew from the Montanists, and 'propagated conventicles of his own,' which is rendered less likely by the fact that the Montanist sect survived in Africa till the 5th century, under the name of 'Tertullianists.'

Tertullian was a man 'of an eager and vehement disposition' (Jerome), who threw all his great gifts of learning, imagination, eloquence, and wit into the religious controversies of his time for thirty years (190–220). Along with the Roman love for substantiality and strength, he had the 'bitter, stern, and harsh temper' which Plutarch ascribes to the Carthaginians. He wanted the sweet reasonableness and calmness, the feeling for harmonious form, and the instinct for speculative thought that distinguish the greatest Greek fathers of the church. He had the heart of a Christian with the adroit intellect of an advocate. His aim is always to make his adversaries appear ridiculous and contemptible. He pours unsparingly upon them a fiery stream of strong argument and satire, mixed with the sophisms, insinuations, and hyperboles of a special pleader. His style is most vivid, vigorous, and concise, abounding in harsh and obscure expressions, abrupt turns, and impetuous transitions, with here and there bursts of glowing eloquence, reminding the reader at one time of Carlyle, at another of Lamennais. What appear to be African provincialisms Niebuhr contends are only words and expressions taken from the ancient Latin writers. He was the first to give such words as *persona*, *liberum arbitrium*, *trinitas*, *satisfactio*, *sacramentum*, *substantia*, &c. the place they hold in Christian theology. Many sentences of Tertullian's, as, for example, 'the blood of the martyrs is the seed of the church;' 'Christ is truth, not custom;' 'It is absolutely credible because absurd—it is certain because impossible;' 'the human race has always deserved ill of God;' 'the unity of heretics is schism;' 'it is contrary to religion to compel religion;' 'how wise an arguer does ignorance seem to herself to be,' have become proverbial. 'Who can sufficiently extol the eloquence of Tertullian!' exclaims Vincentius of Lerinum; 'almost every word conveys a thought, every sentence is a victory. He is among the Latins what Origen is among the Greeks—the greatest of all.' Like Origen, Tertullian was a man of great genius, sincerity, and zeal, a vigorous ascetic, and an indefatigable worker, and, though wielding great influence over his contem-

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poraries, was never more than a presbyter. Like him, too, this champion of the Christian faith against all opponents, Jews, heathens, and heretics, was himself a heretic to the majority of the Christians of his time. Both show the same contempt of the world and enthusiasm for martyrdom. But in the tendency of their views the contrast between them is as striking as in their natural temper and their literary style. Tertullian is an intense realist, with leanings towards materialism, Origen a pure idealist. Origen, like Justin, holds that Greek philosophy was 'a preparation for the Gospel,' 'a fragment of eternal truth from the theology of the ever-living Word.' Tertullian thinks that 'philosophers are blockheads when they knock at the gates of truth,' and that 'they have contributed nothing whatever that a Christian can accept.' 'The eloquence of the one,' says Pressensé, 'is broad and transparent like his genius: it is a noble, full, majestic river: that of the other is a turbid mountain-torrent. Origen speaks to philosophers as a Christian philosopher: Tertullian is a tribune of the people passionately haranguing the crowd in the forum or at the cross-roads; he is the ancient orator, with his vehement gestures, his vivid images, his grandiose pathos.'

His writings have been called 'Tracts for the Times.' Most of them are short. They are a rich mine of information as to the relations between Christians and heathens in his time. Though perhaps not the first of the Latin Christian writers, Tertullian was the creator of ecclesiastical Latinity, and impressed upon the language a new character, as he bent it to the service of Christian ideas. His works are divided into three classes: (1) Controversial writings against heathens and Jews. His *Apologeticus* (ed. by Woodham, 1843; by Bindley, 1891), addressed to the Roman authorities, is an attempt to establish the Christians' right to toleration. A popular edition of this work is presented in his two books *Ad Nationes*, possibly, as Uhlhorn and Hauck believe, of earlier date. *Ad Scapulam* is a bold rebuke of the persecuting Roman proconsul Scapula. In his *De Testimonio Animæ* he acutely develops the thought that Christianity responds to the religious necessities and postulates of human nature. The treatise *Adversus Judæos* is to prove that prophecy is fulfilled in Christ.

(2) Against heretics. Against these Tertullian takes his stand, as Irenæus did before him, on the old apostolical tradition as the fixed foundation of belief. He formulates this position juristically in his *De Præscriptione Hæreticorum*. Against the Gnostic attempts to volatilise Christianity in Gnostic spiritualism he maintained its reality as a practical form of life in his *De Baptismo*, *Adversus Hermogenem*, *Adversus Valentinianos*, *De Anima* (in which he contends that even the soul is material), *De Carne Christi* (against Docetism), *De Resurrectione Carnis*, and the five books *Adversus Marcionem*. Against the Patripassian heresy he wrote the book *Adversus Praxean*.

(3) Practical and ascetic treatises. It is especially in these writings relating to Christian life and discipline that we can trace Tertullian's increasing hostility to the church and adoption of the Montanist views, which had great influence among African Christians. He hailed the testimony of 'free prophecy' as God's witness against the laxity which the Catholic Church had shown in dealing with the sensual weaknesses of the great multitude within her pale. Hence the division of these treatises into *Pre-Montanist* and *Montanist*. To the former class belong *De Baptismo*, *De Pœnitentia*, *Ad Martyres*, *De Spectaculis*, *De Idolatria*, *De Cultu Feminarum*, *De Oratione*, *De Patientia*, and *Ad Uxorem*; to the latter, *De Corona*, *De Fuga in Persecutione*, *Scorpiace*, *De Exhortatione Castitatis*, *De Monogamia*, *De Pudicitia*, *De Jejunio*, *Adversus Psychicos*, and *De Pallio*; while *De Virginibus Velandis* marks the transition stage.

Tertullian had a greater influence on the Latin Church than any theologian between Paul and Augustine. His Montanism indeed prevented it from being exercised directly, but Cyprian, who called Tertullian 'his master,' was the interpreter who gave currency to his views. The following is a summary of Harnack's estimate of Tertullian (3d vol. of his *Dogmengeschichte*), whom he calls 'the founder of Western Christianity.' Tertullian's Christianity was moulded by the enthusiastic and strict faith of the early Christians on the one hand, and by the anti-Gnostic *regula fidei* on the other. A trained jurist, he sought to express all religion in legal formulas, and conceived the relation between God and man as one of civil law. 'God appears always as the powerful partner, who watches jealously over his rights.' Further, his theology shows a syllogistic-dialectic stamp; it does not philosophise, it reasons, using now the argument *ex auctoritate*, now the argument *e ratione*. He shows striking power of psychological observation. Finally, his writings have a strong practical evangelic tendency; with their vivid appeal to the reader's will, and their simple concrete expression of the Gospel, they appealed not to theologians only, but to all. In these characteristics, and their union, Tertullian became the type of the Christianity of the Western Church.

The best complete edition of Tertullian's works is still that of Oehler (3 vols. Leip. 1853-55). A complete critical edition is being published in the Vienna *Corpus Script. ecclesiast. Lat.* (part i. by Reifferscheid and Wissowa, 1890). The most important studies are those of Kaye (*Eccles. Hist.*, 3d ed. Lond. 1845), Neander (*Antignosticus*, 2d ed. Berlin, 1847; Eng. trans. by J. E. Ryland, 2 vols. 1851), Pressensé (in his *Histoire des Trois Premiers Siècles de l'Eglise Chrétienne*, 1858-77; Eng. trans. 4 vols. 1879), Böhringer (*Biographien*, vol. iii. 2d ed. Leip. 1875), Möhler (in his *Patrologie*, vol. i. Regensburg, 1840), Grotemeyer (Kempen, 1863-65), Freppel (Paris, 1864), Hauck (with a selection of characteristic extracts, Erlangen, 1877), J. M. Fuller (in Smith and Wace's *Dictionary of Christian Biography*, vol. iv. Lond. 1887), Farrar (*Lives of the Fathers*, vol. i. Edin. 1889), and Ernst Noeldechen (Gotha, 1890). Neander and Fuller (*loc. cit.*) give excellent summaries of Tertullian's different treatises. See also Harnack, *Dogmengeschichte* (2d ed. 3 vols., Freiburg i. B., 1888-90), N. Bonwetsch, *Die Schriften Tertullian's nach der Zeit ihrer Abfassung* (Bonn, 1878), Koffmane, *Geschichte des Kirchenlateins* (vol. i. Berlin, 1879), and Dr J. van der Vliet, *Studia ecclesiastica. I. Tertullianus* (Leyd. 1891). Translations of nearly all Tertullian's works are included in Clark's *Ante-Nicene Christian Library*.

Teschen (Polish *Cieszyn*), a manufacturing town of Austrian Silesia, on the Olsa, 35 miles ESE. of Troppau. Pop. 13,004. Here, in 1779, a treaty of peace was concluded between Maria Theresa and Frederick II.

Tesselated Pavement. See MOSAIC.

Tessin. See TICINO.

Testacella, a genus of molluscs belonging to the *Pulmonifera*, and represented in Britain by three species. The shell, which consists of but half a whorl, is situated at the hinder end of the body. They are of subterranean habits and carnivorous, feeding chiefly upon earthworms. They usually come out in search of their prey during the night. In winter they form a cocoon-like body of cemented particles of earth, &c., which covers the upper part of the body.

Test Acts, acts meant to secure that none but rightly affected persons and members of the established religion shall hold office, include all such

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acts as enforce oaths of Abjuration, Allegiance, Supremacy, or, amongst the clergy, Uniformity; as well as the Corporation Act of 1661, requiring members of corporations to receive the sacrament after the manner of the Church of England. But the term is specially used of two English statutes imposing certain oaths on the holders of public offices, and directed against Catholics. The act of 1673 directs that all magistrates shall take the oaths of allegiance and supremacy, as well as an oath renouncing the doctrine that it is lawful to take arms against the king, and provides that they must receive the communion according to the rites of the Church of England within a year before their election. A Scottish act was passed in 1681. Another act of 1685 imposed the like conditions on the holders of all public offices, civil and military, and obliged them in addition to abjure all belief in the doctrine of transubstantiation. These acts, which were practically evaded to a large extent by means of an act of indemnity passed every year, and were at various times partially repealed, were not finally repealed till 1829. In Scottish church history of the 17th century 'taking the test' meant taking the oaths, abjuring the Covenant, and recognising the reigning king, oaths enforced on all and sundry, especially on Covenanters, during the 'killing times.' The universities had their own special tests, now abolished save in the case of offices with clerical functions. See OATH.

Testament. See BIBLE, and WILL.

Testing, in Chemistry. See ANALYSIS.

Testing Clause, in a Scottish deed, is the last clause, which narrates when and where the parties signed the deed, before what witnesses, the number of pages of which the deed consists, and who was the person who penned the deed. Moreover, if there have been any interlineations or erasures of important words during the engrossing, these should be mentioned in this clause. The clause is an essential part of a Scottish deed, and no deed written by another than the party is valid unless the testing clause is regular. See DEED.

Test-papers are made by dipping unsized paper into an alcoholic solution of a vegetable colouring matter which changes colour when exposed to the action of an acid or alkaline solution. The paper, after being gently dried, is cut into slips of a suitable size. Hence, by dipping the appropriate test-papers into any solution, we can ascertain whether it is acid, alkaline, or neutral. Litmus and turmeric are most commonly used as the colouring matters; litmus for the detection of acids, and turmeric for that of alkalies. Test-papers are also employed for detecting sulphuretted hydrogen, &c., and for such a purpose the paper must be dipped in the solution of an appropriate substance. Thus acetate of lead paper becomes black in presence of sulphuretted hydrogen, while starch paper becomes blue when touched with iodine.

Testudo. See TORTOISE.

Tetanus (derived from the Gr. *teinein*, 'to stretch'), or LOCK-JAW, is one of the most formidable diseases of the nervous system, and is characterised by an involuntary, persistent, intense, and painful contraction or cramp (see SPASM) of more or less extensive groups of the voluntary muscles, nearly the whole of the body being sometimes affected. The muscles of the neck, jaws, and throat are almost always the first to give evidence of the presence of the disease. The neck feels stiff, the jaws are opened with difficulty, and often become tightly clenched, and the face has a peculiar fixed smile (*risus sardonicus*). The disease spreads to the muscles of the trunk and the larger muscles of the limbs; the former is almost always strongly arched backwards (*opisthotonos*); the hands and feet are usually but slightly affected, if at all. These muscular contractions are very painful; a particularly acute pain is frequently present in the lower part of the chest, probably due to spasm of the diaphragm. Some of the muscles affected, as, for example, those of the abdomen, are so rigid as when struck by the fingers to resemble a board, and a perfect remission of the spasm scarcely ever occurs, except sometimes during sleep. Exacerbations of the spasms, on the other hand, commonly come on every ten minutes or quarter of an hour, usually beginning by an increase of the pain at the sternum, and lasting for two or three minutes: and as the disease advances these paroxysms become more frequent. They may occur spontaneously, or may be induced by the slightest disturbance—a touch, a draught, a noise, or the slightest attempt at movement.

During the exacerbations the face of the patient often presents a positively frightful appearance. The tongue is apt to get bitten during the contractions, which are occasionally so violent as to break the teeth, rupture powerful muscles, and, at least in one case, to fracture the thigh-bone. Death usually results from a mixture of causes, but mainly from want of breath, due to the fixed condition of the respiratory muscles, associated with asthenia (loss of power), and flagging of the heart's action. Fever may be absent during the whole course of the disease, and if present is not generally severe. Sometimes, however, the temperature becomes extremely high (110° or 112° F.) just before death.

The disease occasionally occurs after exposure to cold, still more rarely without any discoverable cause whatever. Such cases are called *idiopathic*. In the vast majority it follows some injury involving a breach of surface (*traumatic tetanus*). It more frequently attends upon severe injuries, but it may result from a slight prick or scratch, and the severity of the disease bears no proportion to the extent of the wound. Nor does the seat of the wound seem to have any importance; the popular idea that injuries of the thumb are specially apt to lead to it is not supported by statistics. The period of its commencement varies from a few hours to many days after the injury; death occurs in most fatal cases within a week of the first onset. It is met with at all ages, but is much more common in males than females. Idiopathic cases, and those commencing more than three weeks after an injury, are as a rule less severe. But 'taking all forms together in a fair average number of cases, the proportion seems to be 7½ deaths to 1 recovery' (Holmes's *System of Surgery*).

Various forms of local irritation may set up a localised trismus or lock-jaw, but its distinction from true tetanus seldom presents much difficulty. Tetanus at its commencement is sometimes mistaken for rheumatism, and has some resemblance to Hydrophobia (q.v.). It may be closely imitated by hysteria, but particularly by poisoning with nux vomica, or its alkaloids strychnia and brucia. In these cases the more sudden development of the symptoms, and the less persistent rigidity between the spasmodic paroxysms, are the most prominent distinguishing features.

With regard to *treatment*, perfect quiet and the avoidance of all possible causes of irritation and excitement are the first things to be insisted upon. The patient's strength must be maintained by liquid nourishment, given by injection, or even administered under chloroform if necessary. Many drugs have been used; chloral in repeated doses perhaps with most apparent benefit, but the great majority of cases have hitherto defied all treatment.

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The *cause* of the disease has long been suspected to be a micro-organism; among other reasons, because tetanus, as a result of surgical operations, has become much less frequent since the introduction of Antiseptic (q.v.) methods. Nicolaier (in 1884) first described the bacillus now known to be the cause of tetanus; but Kitasato, working in Berlin, was the first to obtain pure cultures, and to give a complete demonstration that tetanus must be added to the infective diseases (1889). Methods have since been discovered whereby animals can be rendered 'immune' or incapable of inoculation with tetanus. Tizzoni and Cattani, experimenting with such animals, found a substance in their blood, called by them the *antitoxine* of tetanus, which neutralises the virus of tetanus even outside of the body, and when injected into other animals produces immunity against, and even cure of the disease (1891). This substance has been used in the treatment of the disease in the human subject, and up to April 1892 six successful cases had been reported. It may be hoped therefore that a means has been found of diminishing the ravages of this terrible disease.

Tetany is a rare and little understood disease of the nervous system, occurring both in children and adults, characterised by recurring attacks of tonic spasm of various muscles, particularly those of the fingers and toes. It is associated with defective hygienic conditions, imperfect ventilation, poor diet, and in children with Rickets (q.v.). Complete recovery generally ensues; fatal cases are very rare.

It is not yet definitely settled to which of these two very different diseases *tetanus* or *trismus neonatorum* (of newborn children) should be referred. It has been supposed on the one hand to be traumatic tetanus, due to the injury to the umbilical cord at birth, and resembles it in its great fatality, and in the extension of the spasms over the larger muscles (of trunk, &c.); the opposite view, that it is an extremely aggravated form of tetany, is supported by the facts that the muscles of the fingers and toes are specially affected, and that improved ventilation alone has been known to produce a great diminution of the disease in lying-in hospitals.

Tetanus, or lock-jaw, both traumatic and idiopathic, occurs in most of the domesticated animals, but most frequently in horses and sheep. It is now proved to be due to the action of a microbe, the *Bacillus Tetani*, which gives rise to the formation of a ptomaine termed *Tetanine*, by the action of which the tetanic symptoms are induced. This bacillus is also found in garden-mould, and most probably tetanus is induced by the entrance of the microbe into a wound or exposed structure. Tetanus has been transmitted from diseased to healthy animals by inoculation. The symptoms usually come on gradually, involve most of the muscular structures, which become hard and rigid; the nose is protruded, the limbs move stiffly, the tail is upraised, the bowels are constipated. The patient must be kept perfectly quiet, and in an airy but fairly warm place, and plentifully supplied with cold water, and with soft, sloppy, but nutritive food, which he will usually greedily suck in through his firmly-closed teeth. A full dose of purgative medicine must at once be given; extract of belladonna repeated twice or thrice daily is occasionally serviceable; any discoverable wound or injury should be fomented or poulticed; bleeding, sedatives, and all causes of irritation must be avoided. In adult animals most cases are fatal; but amongst young animals many recoveries occur.

Tetbury, an old market-town of Gloucestershire, 5 miles NW. of Malmesbury. Pop. 2173.

Tête-du-Pont. See BRIDGE-HEAD.

Tetrao. See GROUSE.

Tetrarch (Gr. *tetrarchēs*, Lat. *tetrarcha*, 'governor of the fourth part,' i.e. of a country), a title originally designating what is signified by its etymology, the governor of one of four divisions of a kingdom or country; but in the usage of the later Roman empire given undistinguishingly to all minor rulers, especially in the East, possessing sovereign rights within their territory, but dependent on the emperor, and in many cases removable at his pleasure. This was especially the case in Syria, where the princes of the family of Herod are called indiscriminately by this title (Luke, iii. 1) and by that of king (Matt. xiv. 9).

Tetter, the popular name for skin diseases of the kind described under PSORIASIS and HERPES.

Tetuan (Arab. *Tetawin*), a port of Morocco, about 4 miles from the sea, 22 miles S. of Ceuta. It is surrounded by walls, flanked with towers, and is defended by a castle. Its harbour does not admit large vessels; but a brisk trade is carried on, mainly by the Jews, in fruit, wool, silk, girdles, leather, cotton, &c., and it exports provisions largely to Ceuta. Tetuan was taken by the Spaniards under O'Donnell (q.v.), February 1860, but was evacuated next year. Pop. 22,000 (one-third Jews).

Tetzel, JOHN, the famous seller of indulgences, was born at Leipzig about 1455, and in 1489 entered the Dominican order. His ability and success as a preacher led to his being entrusted in 1516 with the charge of preaching an indulgence in favour of contributors to the fund for building the church of St Peter's at Rome (see INDULGENCE). It was in opposition to him that Luther published his celebrated theses, on the 31st October 1517. Tetzel published counter-theses and detailed replies, but was himself severely rebuked by the papal delegate Miltitz, for the extravagance in statement and other improprieties which had brought so much scandal upon the church. His personal character was the subject of controversy. He died of the plague at Leipzig in August 1519.

There are (hostile) Lives by Hofmann (1844) and Korner (1880), and from the Catholic point of view by Gröne (2d ed. 1860) and Hermann (2d ed. 1883). See also Kayser, *Geschichtsquellen über Tetzel* (1877).

Teutoburger Wald. See ARMINIUS.

Teutonic Knights, one of the three military-religious orders of knighthood founded during the period of the Crusades. Certain merchants of Bremen and Lübeck, witnessing the sufferings of the wounded Christians before Acre in 1190, were so moved with compassion that they erected tent-hospitals for them, and provided for surgical and nursing attendance. There had been a German hospital in Jerusalem from 1128 to 1187; and the new arrangement at Acre was in some sort a continuance of this, being called the Hospital St Mary of the Germans in Jerusalem. The new hospital, the attendants and founders of which formed themselves into a monastic order with the same rules as the Knights Hospitallers of St John, found a patron in Duke Frederick of Swabia, and through him secured the countenance of his brother, the Emperor Henry VI., and the confirmation of the pope (1191). Seven years later it was converted into a knightly or military order; and the change was stamped with the papal approval in 1199. The knights, in addition to the usual monastic vows, bound themselves to tend the sick and wounded and wage incessant war upon the heathen. Their distinguishing habiliment was a white mantle with a black cross. The chief officer of the order was the grand-master or 'high-master,' who was assisted by five other dignitaries. The chapter consisted of these six officers in conjunction with

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the provincial masters. The minor districts and individual castles were governed by commanders, who constituted also the respective provincial councils. There was, moreover, a class of 'serving brothers,' who performed menial offices about the hospitals; and to these were added in certain places a class of inferior female domestics called 'half-sisters.'

About the year 1225 the Duke of Masovia (in Poland) invited the Teutonic Knights to come and help him against the heathen Prussians. The grand-master, Hermann von Salza, sent a body of knights, who experienced little difficulty in establishing themselves in the territories of the heathen. Twelve years later they were strengthened by the absorption into their order of the Brethren of the Sword, a military order which had been formed to convert to Christianity with the sword the Livonians, Esthonians, and Courlanders. At length the successive encroachments of the knights roused the Prussians to bitter opposition. A fierce warfare was then carried on for nearly a quarter of a century; but by 1283 the knights were masters of the territory lying between the Vistula and the Memel, and as heirs of the extinct Brethren of the Sword they had also extensive possessions in Livonia and Courland. In 1309 the executive officers of the order established themselves in the great castle of Marienburg, near the Vistula. After subduing the Prussians, the order entered upon a hundred years' contest against the Lithuanians. But a most serious blow was struck at the knights by the conversion of the Lithuanians to Christianity and the accession (1386) of their prince to the throne of Poland. From this time, having lost their main *raison d'être*—fighting against the heathen—the order began to decline. During the period of its prosperity, however, it had acted as the principal force in the politics of the Baltic countries; and both by its own exertions and by the encouragement it gave to the Hanseatic traders it was the means of spreading German civilisation and manners throughout what are now the Baltic provinces of Russia. The order suffered an incalculable loss of prestige through the terrible defeat inflicted upon them by the Poles and Lithuanians at Tannenberg in 1410. A desperate attempt to recover their power resulted (1466) in the loss of West Prussia and the alienation of the esteem and affection of their subjects in East Prussia, which they could only retain as a fief of Poland. In 1525 the order was secularised; its grand-master, Albert of Brandenburg-Anspach, being created hereditary duke of Prussia under the suzerainty of Poland. The headquarters of the order—for it still possessed several estates scattered throughout the German empire and in one or two other countries—was fixed at Mergentheim in Swabia, and its possessions were reorganised in twelve bailiwicks. Thus it existed until 1801, when the estates west of the Rhine were annexed by France; in 1809 the order was entirely suppressed by Napoleon in all the German states. This left only a couple of bailiwicks in Austria and one at Utrecht; and these still exist, severely aristocratic in both countries. The Austrian branch, reorganised in 1840, justifies its existence by maintaining an organisation for the care of the wounded in war.

See Voigt, *Geschichte des deutschen Ritterordens* (1859); Lohmeyer, *Geschichte von Ost- und West-Preussen* (1880); and Perlbach, *Statuten des Deutschen Ordens* (1890).

Teutons, a group of peoples speaking Teutonic tongues, an important division of the Aryan (q.v.) family of languages. The name is derived from the ancient Teutones (and is a form of the modern German *Deutsch*, O. H. Ger. *Diutisc*, or Gothic *Thiudisko*; see GERMANY). The Teutonic stock of nations, as they exist at the present day, is divided into two principal branches: (1) The Scandinavian, embracing Danes, Swedes, Norwegians, Icelanders; and (2) the Germanic, which includes, besides the German-speaking inhabitants of Germany proper (see GERMANY) and Switzerland (q.v.), also the population of the Netherlands (the Dutch), the Flemings of Belgium, and the descendants of the Angles, Saxons, and Jutes in Great Britain, together with their offspring in North America, Australia, and other British colonies—the English-speaking peoples of the world. It is necessary in this case, as in all similar cases, to guard against making language the sole test of race. In many parts of Germany where German now prevails Slavic dialects were spoken down to recent times, and in some places are not yet quite extinct. And in Great Britain it is unreasonable to suppose that the Anglo-Saxon invaders exterminated the native Celtic population, or even drove more than a tithe of them into Wales and the Highlands. The mass undoubtedly remained as subject serfs, learned the language and customs of their masters, and gradually amalgamated with them; so that, in point of blood, the English are perhaps as much Celtic as Teutonic. The same remark applies more strongly to Scotland and Ireland than to England; and the mingling of races in the United States has been very great, although the non-Teutonic elements have been dominated and assimilated. See the articles on the several Teutonic lands; EUROPE, Vol. IV. p. 464; ETHNOLOGY; and (for the languages) PHILOLOGY.

Teviot. See ROXBURGHSHIRE.

Tewfik Pasha, MOHAMMED, Khedive of Egypt, was born in 1852, the eldest son of Ismail Pasha, and succeeded on his father's abdication in 1879, in virtue of the arrangement of 1866 between Ismail and the Sultan. The chief events of his reign—the insurrection of Arabi, the war with the Mahdi, the pacification of the Soudan frontiers, and the steady improvement of the condition of Egypt under English administration—have been indicated at EGYPT. Tewfik, a pious Moslem, utterly alien to his father's love of luxury and extravagance, was throughout loyal to his engagements with Britain. He died of the sequelæ of influenza, 7th January 1892, and was succeeded by his eldest son Abbas.

Tewkesbury, a quaint old market-town of Gloucestershire, on the Avon at its confluence with the Severn, 9 miles NNW. of Cheltenham, 10 NNE. of Gloucester, and 15 S. by E. of Worcester. On the site of the cell of the hermit Theoc, from whom the place got its name, was founded in 715 a monastery, refounded in 1102 by Robert Fitzhamon as a great Benedictine abbey. Its noble church, consecrated in November 1123, measures 317 feet by 124 across the transepts, and remains essentially Norman, in spite of later additions—Early English, Decorated, and Perpendicular. It was restored by Scott in 1875–79. Special features are the west front and the massive central tower, 132 feet high. Many of the Clares, Despencers, Beauchamps, and other lords of Tewkesbury are buried here, as also the murdered Prince Edward and (possibly) Clarence; and in 1890 a tablet was erected to Mrs Craik, the scene of whose *John Halifax* is laid in Tewkesbury. The place has also a town-hall (1788), a corn-exchange (1856), Telford's iron bridge over the Severn (1824), with a span of 176 feet, a free grammar-school, &c. The thick mustard Falstaff speaks of is a thing of the past, and the trade is chiefly agricultural. Within half a mile was fought (4th May 1471) the famous battle of Tewkesbury, in which the Yorkists under

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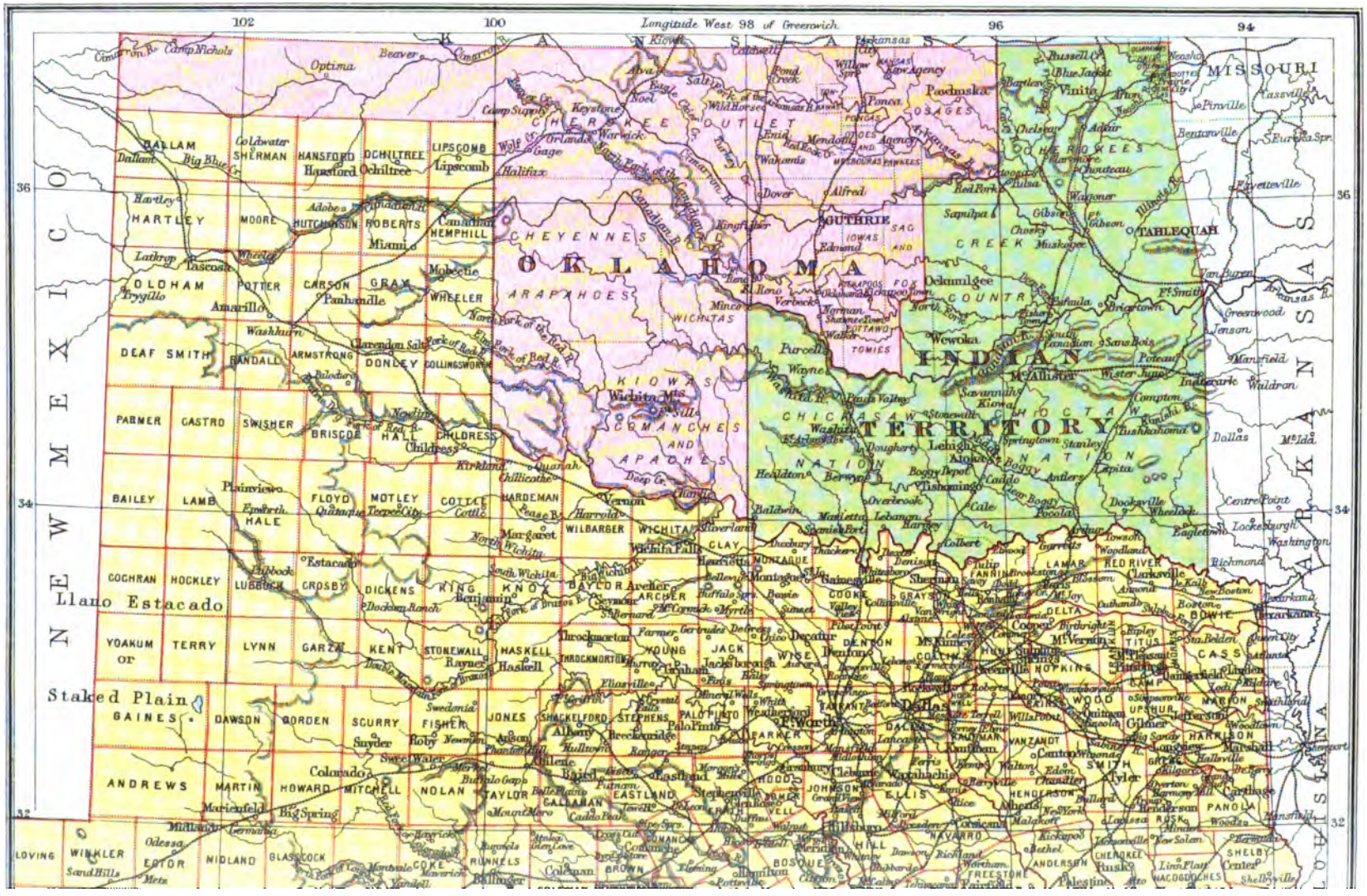

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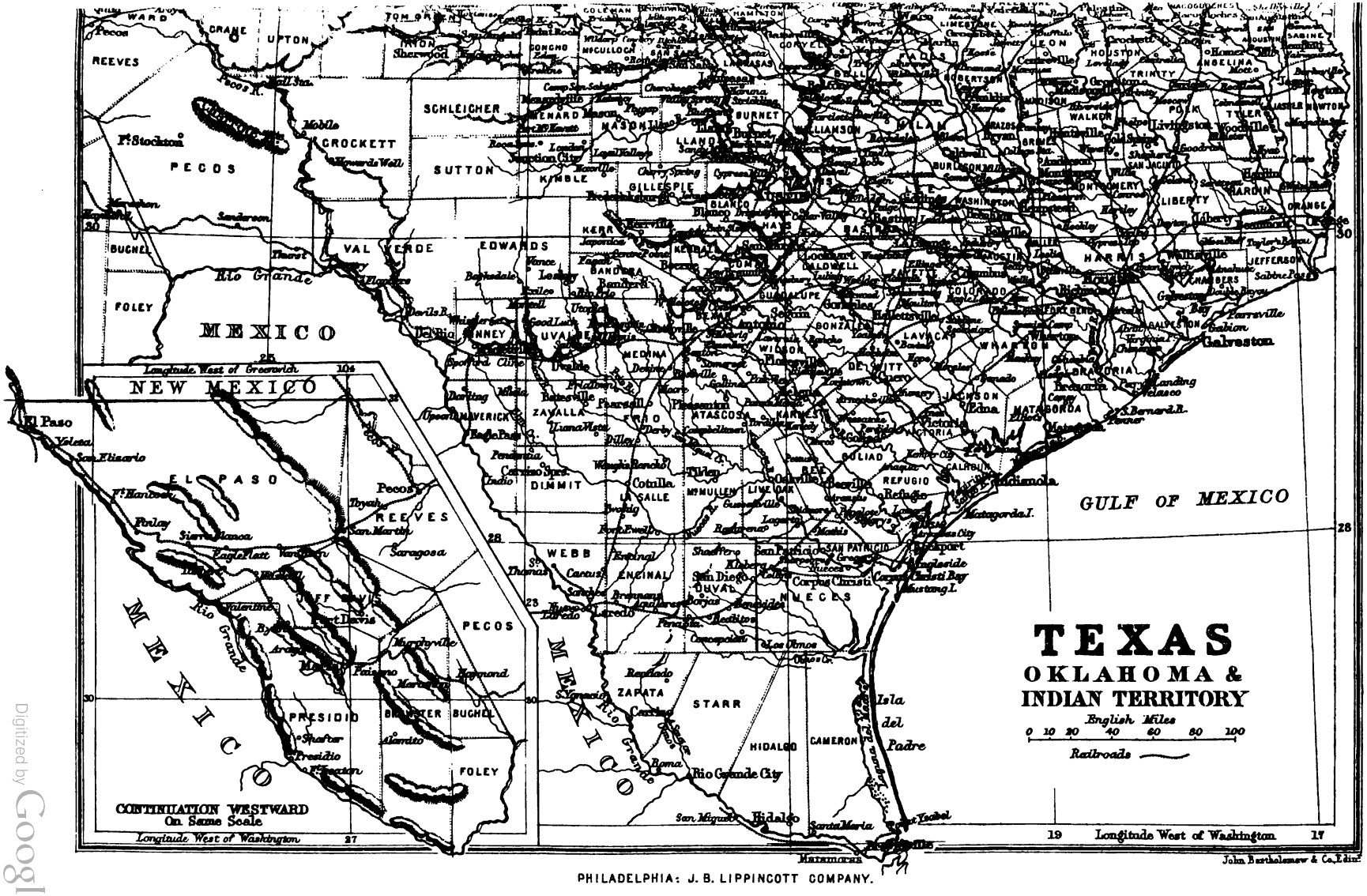

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Edward IV. (q.v.) gained a crowning victory over the Lancastrians. Incorporated by Elizabeth in 1574, Tewkesbury returned two members to parliament from 1609 till 1867, and then one till 1885. Pop. (1851) 5878; (1891) 5269.

See works by Dyde (1790), Bennett (1830), Petit (1848), and J. H. Blunt (2d ed. 1877).

Texas is the extreme south-western state of the American Union. It extends farther south than any of the United States except Florida, and lies in 25° 51′—36° 30′ N. lat. and 93° 27′—106° 43′ W. long. Its very irregular boundary consists largely of natural lines formed by rivers and the Gulf of Mexico. Oklahoma and Indian Territory lie to the north, Arkansas and Louisiana to the east, Mexico and the Gulf to the south, and New Mexico to the west. Texas not only is the largest state in the Union, but forms, with its area of 265,780 sq. m., nearly 9 per cent. of the total area of the United States, exclusive of Alaska. It is as large as New England, the Middle Atlantic States, Ohio, and Illinois combined, or larger than either France, Austria-Hungary, or Germany, and more than twice as large as the British Isles. Its extreme length is about 900 miles, and its greatest breadth 750; the coast-line is 400 miles long. The surface of Texas is greatly diversified. From the low, flat prairie lands along the coast the land rises in a series of gradual elevations till it reaches the plateau and mountains of the distant west, where some of the peaks attain a height of 5000 feet above the sea. The coast is low and sandy. From the mouth of the Sabine River to that of the Rio Grande there extends a fringe of low islands and peninsulas, separated from the mainland by lagoons several miles in width. These islands are characterised by sand-dunes which rise about 20 feet above the beach. Padre Island, extending north from the mouth of the Rio Grande, is more than 100 miles in length. The alluvial coast-belt, extending from 25 to 60 miles inland, comprises both fertile lowlands and stretches of barren soil. In the waste portions there are extensive areas of cactus and thorny mesquite chaparrals. A white, sandy tract reaching south and west from Corpus Christi Bay to the Rio Grande is known as 'the desert.' Beyond this coast-plain lies a terrace of rich rolling land called the 'prairie belt.' In the eastern prairie sections there are extensive timber regions of live oak and deciduous forest trees, which cover an area greater than that of the state of Kentucky, not including two wide forest-belts called 'cross-timbers,' which extend southward from the Red River. To the north and west of the prairies the land rises and presents a rough, broken surface, with occasional bluffs. Much of the soil is fertile, and nearly all of it is excellently adapted for grazing. On the southern border of the plateau the elevation is about 1000 feet, but a height of 2000 feet is reached as the ascent continues toward the arid *mesas* of the *Llano Estacado* and the base of the Rocky Mountains, from which some outlying ridges extend into the state.

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There is every variety of soil, from the fertile lands of the river-bottoms and prairies to the sterile sand of the southern desert. The coast-prairies have in general a sandy loam. In those of the interior there are heavier brown and black loams, while in the northern part of the state there are great areas of red lands. In the south and south-east, where fortunately much of the best land is located, the rainfall is ample, but the supply in the west and north-west is less reliable. However, it has been shown that even the *Llano Estacado*, or Staked Plains, which were once considered utterly uninhabitable, are capable of supplying plenty of water for irrigation by the use of artesian wells and windmills. The northern winds are usually dry, the rain comes almost entirely from the south-west, and the winter months are generally the driest. The best water-supply is found in the timber-lands. In a state extending through eleven degrees of latitude there is naturally found a considerable range of temperature. The climate on the coast-plains is semi-tropical, but is tempered by the winds from the Gulf. A dry, healthful climate prevails in the middle region, and the north experiences cool winters, with heavy snowstorms at times. The air of western Texas is so dry that meats are perfectly preserved in the open air without salt, and carcases of dead animals on the plains omit no odour. A notable feature of Texas climate is the 'norther,' which is a sudden and extreme change of temperature produced by a rush of cold wind from the north. This unwelcome visitor arrives usually unannounced, except for the fact that its coming is frequently preceded by a spell of warm weather. It ordinarily remains for three days, and the fall in temperature is often as much as 30°. The drainage of Texas is received by the Gulf of Mexico. The Red and the Arkansas rivers convey the waters of the northern part of the state to the Mississippi. The other streams flow directly into the Gulf. The Red and Sabine rivers and the Rio Grande form part of the boundary line. Within the state the most important rivers are the Trinity, the Brazos, and the Colorado. With the exception of the Rio Grande, the Brazos, and the Sabine, nearly all the streams discharge their waters by means of large estuaries, from which steep clay banks rise for some height to the level of the prairie above. Knowledge of the details of the geological structure of Texas is quite imperfect. The coast-plains and prairies are of recent alluvial formation. Beyond these is a broad strip of Tertiary deposits, and farther inland the country belongs to the Cretaceous period, except in the central regions, which are penetrated from the north by contiguous arms of Jura, Trias, and Permo-Carboniferous formations. Large beds of coal underlie portions of the state. The coal-measures are estimated to occupy an area of about 10,000 sq. m., besides which there are extensive beds of brown lignite. There are vast deposits of iron ore, and tin and other metals are also found. Building-stones of excellent quality occur in many districts, and the supply of lime, gypsum, and salt is inexhaustible.

Agriculture and stock-raising have been the leading occupations of Texas. Rather more than one-half of the entire area is practically uninhabited, but settlements are encroaching each year upon the unreclaimed districts, and the primitive methods of the cattle-ranges are rapidly disappearing. Texas is pre-eminently a cattle-breeding state. The abundance of suitable pasturage and the genial climate give it advantages over many other sections. The old custom of sending young cattle in enormous 'drives' into other states, where they were sold to be fattened, is becoming a thing of the past. The owners are more and more 'ripening' their own cattle, thereby securing better prices, and opening the way for manufacturing industries connected with the preparation of beef and hides, and for the direct export of beef abroad from Galveston and New Orleans. Texas ranks first in cattle-raising, and in the number of sheep, horses, mules, and swine it is almost without a rival. The breeds of all varieties of live-stock have been of late very much improved. Wool and dairy-produce are important staples. Since 1883, when its crop surpassed that of Mississippi, Texas has been the leading cotton state. Wheat is an important crop, and the other grains are extensively culti-

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vated. Sugar and rice yield abundant harvests along the coast, and fruits in great variety are produced in the southern sections. The principal sugar district is the 'sugar-bowl' in the Brazos delta. Texas has 228 counties, varying in area from 150 to 12,000 sq. m. Of these about 70 are still unorganised. There are ten cities or towns having a population of more than 10,000—viz. Austin, the capital, San Antonio, Dallas, Galveston, Houston, Fort Worth, Waco, Laredo, Denison, and El Paso. It returns eleven members to congress. There is already a large available fund for education, to which the proceeds of the sale of over 50,000,000 acres of land are to be added; this sum will be more, rather than less, than $100,000,000. The state supports two normal schools, and a state university at Austin. There are also in the older towns a number of higher educational institutions and colleges.

The earliest settlements in Texas were made in 1685. The country formed part of the Spanish province of Mexico, which in 1822 threw off the yoke and became a republic. On December 20, 1835, Texas declared itself independent of Mexico, and in 1836 Houston (q.v.) was made president. In 1845 Texas, with an area of 375,000 sq. m., was annexed to the United States. All its territory except that now enclosed within its borders was ceded to the United States in 1850 for the sum of $10,000,000. Texas had maintained continued war with Mexico, and its annexation was the prime cause of the war between that country and the United States. The state seceded from the Union February 1, 1861, and re-entered it April 16, 1870. The growth of Texas has been phenomenal, and, though it ranks seventh among its sister commonwealths in population, it is in many aspects still in a transition period. There were less than 300 miles of railway in operation in 1870, and in 1892 about 9000. In 1870 Texas had a population of 818,579, in 1880 of 1,591,749 (393,384 coloured), and in 1890 of 2,235,523 (492,837 coloured).

See Histories of Texas by H. Yoakum (2 vols. 1856), W. C. Baker (1873), H. S. Theall (1879), and H. H. Bancroft (1885).

Texel, an island belonging to the province of North Holland, at the entrance to the Zuider Zee. It is separated from the mainland by a narrow strait, called the Marsdiep, contains about 35,000 acres of arable and pasture lands, and has a population of about 6500 inhabitants, who keep some 35,000 sheep, famous both for their wool and their cheese. The Marsdiep channel or part of it is also often called the Texel; and here or hereabouts many important naval battles have been fought. Blake defeated Tromp and De Ruyter in 1653; Prince Rupert fought De Ruyter in 1673; Duncan blockaded the Texel (for a time with a single ship) in 1797; and a Dutch fleet of twelve ships of war and thirteen Indiamen surrendered to Admiral Mitchell in 1799.

Textiles, fabrics produced by weaving. See the articles in this work on Weaving, Spinning, Cotton, Fibrous Substances, Hemp, Linen, Jute, Silk, Wool, &c.; also on Bleaching, Calico-printing, Dyeing, &c.

Tezcuco, a city of Mexico, on the east shore of the salt lake of the same name, 25 miles by rail ENE. of Mexico city. The ancient *Acolhuacan*, once the chief seat of Aztec culture, it still contains traces of old palaces and of a noble aqueduct, and is now the seat of glass-works. In the great drainage scheme for the valley of Mexico and Tezcuco, the sewage is carried off by a tunnel of 6½ miles and a canal of 30 miles. The salt lake has an area of 92 sq. m. Pop. 15,000.

Thackeray, WILLIAM MAKEPEACE, born 18th July 1811, died 24th December 1863. The Thackerays were originally a race of small landholders settled at Hampsthwaite in Yorkshire. In fullness of time, as was often the case with such families, the younger sons began to leave their native village and try their fortunes in other walks of life. In 1711 we find the Rev. Elias Thackeray of Christ's College, Cambridge, established in the rectory of Hawkswell, Yorkshire. His nephew, Thomas Thackeray, became headmaster of Harrow School and the father of sixteen children; the youngest of whom, William Makepeace, was the grandfather of the novelist. This William Makepeace Thackeray went to Bengal in the East India Company's service, from which he retired in 1777 with a fortune. The fourth of his twelve children, Richmond Thackeray, born in 1781, was the father of the novelist. Richmond Thackeray also went to India in the Company's service, where he married Miss Anne Beecher, a renowned Calcutta beauty, the daughter of a fellow civilian.

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William Makepeace Thackeray, the only child of the marriage, was born on the 18th July 1811 at Calcutta. When he was five years old his father died: and soon after his mother married Major Carmichael Smyth, of the Bengal Engineers. She lived to survive her son. There were no children of the second marriage. On the death of his father, Thackeray, then a child of five years old, was sent home. He lived partly under the care of an aunt, Mrs Ritchie, who is recorded to have been surprised to find that her husband's hat fitted the little boy. At eleven he was sent to the Charterhouse, where he remained six years. Innumerable passages in his books prove that his schooldays had as important an influence on his art as the more adventurous boyhoods of Sterne and Dickens had on theirs. It should be added that the broken nose so conspicuous in all Thackeray's caricatures of himself was the accident of a school fight. While Thackeray was at school his parents returned from India and settled near Ottery-St-Mary in Devonshire, which is made the scene of the earlier chapters of *Pendennis*. In 1829 Thackeray was entered at Trinity College, Cambridge. He left the university after two years without taking his degree; but except from the academical point of view his time was not wasted. Without being a scholar, he acquired a literary knowledge of the classics, and he gained all those indirect advantages which distinguish Oxford and Cambridge from other seats of perhaps purer learning. For one thing, Cambridge fixed his social status. Though afterwards he was to consort with Bohemians and other strange acquaintances into whose company a man is forced by adversity, he was never a Bohemian, and always faithful to the traditions of the class in which he was born and bred. It was at Trinity that Thackeray first appeared in print, the work being a burlesque of the prize poem on the subject of *Timbuctoo*, which had been won by Alfred Tennyson. 'A poem of mine,' he writes to his mother, 'hath appeared in a weekly periodical, here published and called the *Snob*. . . . Young had a pleasant wine party at which for a short time I attended. *Timbuctoo* received much laud. I could not help finding out that I was very fond of this same praise. The men knew not the author, but praised the poem.'

On leaving Cambridge Thackeray travelled for two years, in Germany for the most part, and on his return determined to go to the bar. It was necessary for him to choose a profession, as his fortune did not exceed some £500 a year. This, moreover, was soon diminished by losses from the

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glad of an excuse to abandon the law for the more immediately remunerative pursuit of literature. From the very first he had a passion for drawing and literary composition, his fancy in both running to caricature. Early in 1833 he became a regular contributor to the *National Standard and Weekly Journal of Literature, Science, Music, Theatricals, and the Fine Arts*, a weekly journal, price twopence, edited by F. W. N. Bayley, Esq., a then well-known journalist. With the nineteenth number Thackeray took the editorship, and subsequently became the proprietor also. 'My *National Standard*, as usual,' he writes from the Garrick Club. 'It has increased in sale about twenty in the last month. At this rate I shall be ruined before it succeeds.' The paper finally came to an end after little more than a year's existence. But art, not literature, was Thackeray's real ambition at that time. 'I think,' he says in a discussion of plans which followed the family losses, 'I can draw better than do anything else, and certainly I should like it better than any other occupation.' And towards the end of 1833 he joined his parents at Paris to study painting seriously. 'I am sure we shall be as happy here as possible, and I believe I ought to thank Heaven for making me poor, as it has made me much happier than I should have been with the money. I spend all day now, dear mother, at the Atelier, and am very well satisfied with the progress I make.' But Thackeray was not destined to realise the ideals of the envied 'J. J.' of *The Newcomes*. Money was wanted, and could always be earned by the pen. It is curious to observe that Thackeray, who must, one would have thought, have been conscious of his genius for fiction, was content for years to work in the humble and practical walks of journalism. How much or what he wrote at this period is not known, but it is certain that his portrait appears in a conspicuous place in the group by Maclise of the contributors to *Fraser* which was published in the magazine for January 1835. It was at this time too that he made his famous application to illustrate *Pickwick*.

In 1836 Thackeray married Isabella, daughter of Colonel Shawe, of the Indian army. His bride brought him no fortune, and he must have known that his marriage plunged him in grim earnest into the battle of life. Years afterwards, writing to a friend, he says: 'I married at your age with £400, paid by a newspaper which failed six months afterwards, and always love to hear of a young fellow testing his fortune bravely in that way.' The newspaper which failed was the *Constitutional*, the property of the Metropolitan Newspaper Company, of which Thackeray's stepfather was chairman. It was started to rival the leading daily papers, but it only existed from September 1836 to July 1837, when it failed, carrying with it the rest of the fortune of Thackeray and his parents. During the first months of the life of the *Constitutional* Thackeray acted as Paris correspondent. Early in 1837 he moved with his wife to London, living first in Albion Street, Hyde Park, where his eldest daughter was born, and then at Great Coram Street. The marriage was a very happy one, and, in spite of the failure of the *Constitutional*, work was abundant and the future promising. Thackeray was writing regularly in the *Times*, which was then no less important than it is now, and also in the *New Monthly*, *Fraser's Magazine*, and in Cruikshank's *Comic Almanacks*. It is perhaps worth mentioning that in the *Times* he wrote the review of Carlyle's *French Revolution*. In 1838 was born a second daughter, who died in infancy; and in 1840 a third, Mrs Leslie Stephen, who died in 1875. The illness affected Mrs Thackeray's mind, and she neve recovered, though she is still alive. This mis fortune broke up the home. The children wer sent to Paris to their grandmother, and for a yea Thackeray travelled about with his wife fror watering-place to watering-place, as the doctor recommended, but without result. The truth ha to be realised, and Thackeray went back t London, alone and worse than alone. But hi genius was by this time asserting itself, and though his success in the vulgar sense of the wor was not assured till the publication of *Vanit Fair*, not a year passed without his contributin to the magazines—in addition to a great mass o journalism—work the quality of which is not no disputed. In 1840 appeared his first book, *Th Paris Sketch-book*, a series of reprints, followed i 1841 by the *Comic Tales and Sketches*, which con tained the *Yellowplush Papers* from *Fraser*, *Majo Gahagan* from the *New Monthly*, and the *Bedfor Row Conspiracy*. These publications were a failure In the same year the *Hoggarty Diamond* and th *Shabby Genteel Story* appeared in *Fraser*, followe by *Barry Lyndon* and *Men's Wives* in the sam magazine. In 1843 and 1846 appeared respectivel the *Irish Sketch-book* and *Cornhill to Cairo*. ' can suit the magazines,' he wrote to a friend, 'bu I can't hit the public, be hanged to them.' How ever, the magazines, and more especially *Punch* the staff of which he joined in 1842 both as write and drawer of pictures, enabled him in 1846 to se up house again; and he brought his family ove from Paris to Young Street, Kensington Square He was installed in this new home when the publi cation of *Vanity Fair* began, in monthly numbers early in 1847; at which time he was also bringin out the *Snob Papers* in *Punch*. *Vanity Fair* wa not at first a success. The earlier numbers faile to attract attention, and there was even a talk o stopping the publication altogether. Towards th end of the year, however, luck changed. Thackera himself used to say that it was the success of th first of his Christmas books, *Mrs Perkins's Ball* which made him fashionable. But, whatever th cause, there was no doubt about the fact. Ever month the sale increased, and by the time *Vanit Fair* was finished it had made the author's reputa tion. Thackeray was no longer the servant, bu the master of the public.

Vanity Fair had two results for Thackeray—th first, that he became a lion of society, and for som years enjoyed or endured the consequences of hi position; the second, that he had no longer to lool to *Punch* and the magazines for bread. The las number of *Vanity Fair* appeared in July 1848. I was followed in November of the same year b the first instalment of *Pendennis*. *Pendennis* wa followed by *Esmond*, which was published in thre volumes in 1852; and Thackeray then sailed fo America with his lectures on the humorists, whic he had already delivered with great success i London. On his return in 1853 *The Newcome* began to appear; and on its conclusion in 1855 after the publication of *The Rose and the Ring* which was begun at Rome for the amusement o his children, Thackeray again made a journey t America with his lectures on the 'Four Georges. In 1857 he tried to get into parliament, standing fo the city of Oxford as a Radical against Mr Card well, but was defeated by a majority of seventy three. During this year and the next the *Vir ginians* came out. On the 1st January 1860 th *Cornhill Magazine* made its appearance, wit Thackeray as editor. To the *Cornhill* he contrib uted *Lovel the Widower* and *Philip*, which seen to have been written somewhat against the grain though *Philip* is specially interesting for the auto

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biographical element which it contains. But if the *Cornhill* did not bring out Thackeray's best work as a novelist, it furnished the occasion for the *Roundabout Papers*, the desultory form of which was a source of strength, not of weakness, and showed his powers at their best. In 1862 he gave up the editorship of the *Cornhill*, not being equal to the task of refusing manuscripts; but he continued to work for the magazine, and in that year he moved into a new house which he had built on Palace Green, Kensington. He always had a taste for bric-a-brac, which was not so fashionable then as now; and this house was the first built in London in red brick, in the style of Queen Anne, which has since taken such developments throughout the country. Here he began to write *Denis Duval*, which, so far as he had completed it when he died, promised to be as great as anything he had done. But his health, which had practically been broken by a fever caught in Rome in 1855, was bad. No immediate danger was feared, but he was found dead in his bed on the morning of Christmas Eve, 1863. He was buried in Kensal Green. His bust is in Westminster Abbey, in Poets' Corner.

The best commentary on Thackeray's books is furnished by the story of his life, as will be seen, it is hoped, even from the short account we have given. The qualities of his work speak for themselves to the least experienced of those who read him, and little need be said by way of exposition. It may be worth while, however, to point out that as an artist he is unsurpassed by any novelist, either in style or in his powers of description and of character drawing, or in the crowning gift of telling a story. His ideal of the novel was, like Fielding's, that it should be not an affair of plot or a form of idyll, but a prose epic; and if this ideal has ever been approached it is surely in *Vanity Fair* and *The Newcomes*. In the second place, it is worth dwelling for a moment on Thackeray's extraordinary sense of fun. So much of his humour is tinged with irony that readers sometimes fail to observe what sources of natural laughter are in his books, and what an unrivalled exhibition they give of purely comic power. Lastly, a word must be said about his satire. There will always be a class to whom Thackeray must appear as attacking the very essence of human society and turning to ridicule its most useful and ornamental members. Critics of this school can naturally never forgive him or sympathise with his genius. There is another class which takes a different view, and considers that what Thackeray calls 'snobbishness' is neither an essential nor a necessary part of human nature. Which of these two opinions may be correct it is impossible to prove; but if one turns from what Thackeray ridiculed to what he admired, it must be admitted that for a satirist his views of life are strangely sentimental. No one, it is safe to assume, ever read *Vanity Fair* without preferring Rawdon Crawley to his brother Pitt. But if those who think the *Book of Snobs* unjust will consider the reasons for this preference, they will understand why Thackeray disliked some things and why he cared for others.

No formal biography of Thackeray has ever been published. The best account of his life is given in a volume in the 'Great Writers' series (1891), by Mr Herman Merivale and Mr F. T. Marzials, who had access to some privately printed papers. There is also an interesting collection of his letters, edited by Mr Brookfield for *Scribner's Magazine* (1887). Many specimens of his drawings may be found in *The Orphan of Pimlico* (1875). The best portraits of him are by Samuel Lawrence, prints of which are familiar, and versions of which by the artist are in the National Portrait Gallery. In the same gallery there is an interesting bust of Thackeray as a boy. There are also copies of a vigorous little statuette of him by the late Sir Edgar Boehm.

His eldest daughter, ANNE ISABELLA, novelist, is better known still as 'Miss Thackeray' than by her married name, Mrs Ritchie. Born in London in 1837, she passed her childhood in Paris, her girlhood at Kensington, and first appeared as an author in vol. i. of the *Cornhill* (1860) with 'Little Scholars.' To this sketch succeeded a dozen or more volumes of novels, tales, biographical essays, &c., of which may be mentioned *The Story of Elizabeth* (1863), *The Village on the Cliff* (1867), *Old Kensington* (1873), *Miss Angel* (1875, its heroine Angelica Kaufmann), *Mrs Dymond* (1885), *Records of Tennyson, Ruskin, and Browning* (1892), and her dainty modern recasts of such old-world stories as 'Bluebeard' and 'Cinderella.' Tender, delicate, harmonious, her books are feminine as very few women's books, and are just for that reason delightful. In 1877 she married her cousin, Mr Richmond Thackeray Ritchie.

Thais, an Athenian courtesan, famous for her wit and beauty, who was in Asia with Alexander the Great, and according to Cleitarchus—a doubtful authority—induced him, when flushed with wine, to fire the palace of Persepolis (q.v.). After his death she had several children by Ptolemy Lagi.

Thalberg, SIGISMOND, one of the most eminent pianists of the century, was born in 1812 at Geneva, where he received his early education under the careful supervision of his mother, the Baroness Wetzlar. At the age of ten he was removed to Vienna, where he continued his studies, showing a special aptitude for languages and music, in which subjects he received instruction from the best masters, as his father destined him for a diplomatic career. Thalberg's first appearance as a pianist was at the age of fourteen, when he played at an evening party at Prince Metternich's. This success was followed up by numerous appearances in Paris, until, overcoming his father's scruples, he was allowed to abandon diplomacy for music. He made tours in 1839 through Belgium, Holland, England, and Russia, and afterwards through Spain, Brazil, and North America, finally settling down at Naples in 1858, where he died on 27th April 1871. Thalberg married Madame Boucher, daughter of the celebrated Lablache and widow of a Parisian artist. His musical compositions comprise more than ninety numbers, principally fantasias and variations. His operas *Cristina* and *Florinda*—the latter played before the Queen in London in 1851—were absolute failures. As a pianist, in graceful and brilliant execution and in manual dexterity, he had scarcely a rival. It is said that the under tips of his fingers were 'real little cushions,' which were used with such effect in producing wonderful legatos that Liszt once made the remark: 'Thalberg is the only artist who can play the violin on the keyboard.'

Thales, an early Greek philosopher, founder of the Ionic or physical school of philosophy, and one of the Seven Wise Men, was a native of Miletus, in Asia Minor, and flourished towards the close of the 7th century B.C. He is said to have recommended the Ionians, who were menaced by the Persians, to form a federation against their powerful enemy, and to select Teos as the capital, and later we are told he induced the Milesians to withdraw from a union with Crœsus against Cyrus. He is also said to have predicted the eclipse of the sun which happened in the reign of Alyattes. Thales is regarded by some as the first Greek that speculated on the constitution of the universe. According to him the original principle of all things is water, from which everything proceeds, and into which everything is again resolved. In connection with this doctrine he had, it seems, some idea of a soul or force in water productive of all the phenomena we see.

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Thali'a. See MUSES.

Thallium (sym. Tl, equiv. 203·6) is a metal which derives its name from the Greek word *thallos*, 'green,' because its existence was first recognised by an intense green line appearing in the spectrum of a flame in which thallium is volatilised. It was discovered by Mr Crookes in 1861 in the seleniferous deposit of a lead chamber of a sulphuric-acid factory in the Harz Mountains; and it was soon obtained in large quantities by M. Lamy. Thallium is slightly heavier than lead—a metal which it resembles in its physical properties. It is very soft, being readily cut with a knife or drawn into wire; and its freshly-cut surface exhibits a brilliant metallic lustre and grayish colour, somewhat between those of silver and lead. In contact with the air it tarnishes more rapidly than lead, and becomes coated with a thin layer of oxide which preserves the rest of the metal. It fuses at 554° (290° C.), and at a red heat becomes volatilised. The metal and its compounds give a bright green tint to colourless flames; the spectrum of thallium is marked by a single sharply-defined green line. It is used to produce a green light in firework displays, and is employed to render glass highly refractive. The metal can best be preserved free from oxidation by being covered with paraffin and kept below water. Thallium forms a number of compounds, including three oxides.

Thallus, a vegetative body showing little or no differentiation into leaf, stem, and root, and characteristic of the *thallophytes* or lower Cryptogamia (q.v.), including Algæ (q.v.); Fungi (q.v.), and Lichens (q.v.). Even in the higher members of the ascending series the thallus has neither true vessels nor woody tissue.

Thames, the most important river of Great Britain, flows east-south-east across the south portion of the country. Its four head-streams—the Thames or Isis, Churn, Colu, and Leach—rise on the south-east slope of the Cotswold Hills, the upper part of the main stream being often called Isis (a quasi-classical form of *Ouse*) and not Thames until after it receives the Thame near Dorchester. The Thames or Isis flows east-north-east for about 35 miles, when, curving south-east, it passes Oxford, and flows on to Reading, where, after receiving the Kennet from the west, it again changes its course; and with a generally eastward course it passes Windsor, Eton, Teddington (the lowest of thirty-three locks between here and Oxford, and the highest point to which the tide ascends), Richmond, London, Woolwich, and Gravesend, a few miles below which it expands into a wide estuary, and enters the North Sea. On its tidal estuary, and on the fact that like most British rivers it has no delta, depends the river's importance as a navigable waterway; the navigation is, however, somewhat impeded by what has been called a 'submarine delta'—banks formed of river sediment. From Lechlade to the Nore the direct length is 120 miles, and with the windings may be 250 miles (112 from Oxford to London Bridge); the area of its basin is 6100 sq. m. Throughout the greater part of its course it forms the boundary-line between several of the southern counties. Passing Cricklade, it forms part of the northern boundary of Wilts, and below this point it separates the counties of Oxford, Buckingham, Middlesex, and Essex on the north from those of Berks, Surrey, and Kent on the south, except certain outlying bits of some of these counties. Its chief affluents are the Windrush, Cherwell, Thame, Colne, Lea, and Roding, on the left; and the Kennet, Loddon, Darent, Mole, Wandle, and Medway, on the right bank. At London Bridge the width of the river is about 290 yards; at Woolwich, 490 yards; at Gravesend Pier, 800 yards; three miles below Gravesend, 1290 yards; and at its mouth, between Whitstable and Foulness Point, about 8 miles below the Nore, it is 18 miles across. At the Nore Light, the commonly reputed mouth of the Thames, the breadth is nearly 6 miles. The river is navigable for barges to Lechlade, and it is connected with several important canals, by means of which it maintains communication with the west and south coasts, and with the interior of the country. Vessels of 800 tons can reach St Katharine's Docks; much larger ones can ascend to Blackwall, 6 miles below London Bridge; and the largest sea-going steamers reach Tilbury Docks, 26 miles below (see DOCKS). The part of the river immediately below London Bridge is called the *Pool;* and the part between the Bridge and Blackwall is called the *Port*. Two embankments have been formed, one since 1864 on the north shore from Blackfriars Bridge to Westminster, and one since 1866 on the south shore from Westminster Bridge to Vauxhall. The river supplies London with much of its drinking-water, and carries most of its sewage to the sea (see WATER-SUPPLY; and SEWAGE, Vol. IX. p. 341). Some of the great bridges which span the river at London are described at BRIDGE.

Though the lower Thames has been converted into a sewer, in virtue of this same part of its course the river ranks as the chief commercial highway of the world. Above London the scenery is rich and beautiful, though not romantic or picturesque, the numerous islands or eyots lending a peculiar charm. The Thames is the best beloved of English rivers for those who boat for pleasure. For boat-racing, it divides the honours with the Tyne (see ROWING); the Thames watermen are renowned in song and story. Since Spenser's days 'the silver-streaming Thames' has been sung by England's poets; Herrick calls it 'Silver-footed Thamesis;' Denham's apostrophe (quoted at DENHAM) has long been famous; and Pope has gracefully word-painted much of the scenery of its banks. It was (now alas! long since) famous for its salmon, as it still is for other anglers' fish; below London flounders and eels are still plentiful, while the whitebait is almost peculiar to the lower Thames.

The Thames has a copious bibliography of its own (comprising upwards of seventy entries in Anderson's *British Topography* and upwards of 150 in *Notes and Queries* for 1884). Many of these works are richly illustrated. Of comparatively recent ones may be mentioned that by Mr and Mrs S. C. Hall (1859; new ed. 1878), Robertson (1874), Huxley (*Physiography*, 1877), Farren (1881), Law (1881), George D. Leslie, R.A. (1881; new ed. 1888), Church (1885), Herring (1885), Cassell (*Royal River*, 1886), W. Black (*Strange Adventures of a House-boat*, 1888), Justin M'Carthy and Mrs Campbell Praed (1890), Senior (1890), Mr and Mrs Pennell (1891), and the annual *Dictionary of the Thames from Oxford to the Nore* (since 1881), by Charles Dickens, junior, and other guidebooks.

Thames (or GRAHAMSTOWN), New Zealand, a gold-mining town of 4444 inhabitants, on an inlet of Hauraki Gulf, 40 miles SE. of Auckland.

Thamugas, 'the Numidian Pompeii,' near the Aures Mountains, and 22 miles from Batna, which is half-way by rail from Constantine to Biskra. Here are in the solitude extensive remains of colonnades, temples, a forum, a triumphal arch in honour of the Emperor Trajan (founder of the city), and numerous statues and inscriptions coming down to the 5th century, when the Roman city was destroyed by the barbarians.

Thana, or NORTH KONKAN (see KONKAN), a British district of India, consisting of the island of Salsette and a strip of coast. The chief town,

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Thana, a seaport (pop. 14,846), is 21 miles NE. of Bombay by rail.

Thane (A.S. *thegn*), a member of a class in the old English community that stood distinctly below the old nobility (*eorlas*, &c.), but above the mere landowners or *ceorls*. The word thegn seems to have meant first soldier, then attendant, servant of the king, royal official; and gradually the thanes came to constitute a kind of nobility of service as distinguished from nobility of blood. Finally, however, the ordinary thane was simply a landholder on a larger scale than the ceorl—one who had five hides or more of land—and the dignity was hereditary, the 'king's thane' being a superior class. The thanes nearly corresponded to the Norman knights; and after the conquest they were mostly absorbed into the knighthood. After the reign of Henry II. the name of thane fell into disuse in England. In Scotland, on the other hand, where the title is occasionally used as late as the 15th century, the thane was a hereditary non-military tenant of the crown; and there is no foundation for the notion derived by Shakespeare from Boece, that the Scottish thanes all became earls.

Thanet, Isle of, forms the north-eastern corner of the county of Kent, from the mainland of which it is cut off on the western side by the river Stour and the Nethergong rivulet—the ancient Wantsome channel, completely silted up since the beginning of the 16th century. It is bounded on the N. and E. by the sea, and opens on the south side into Pegwell Bay. It measures 9 miles east and west, and 5 miles north and south, and contains 26,180 acres. On the shores of the island are the well-known watering-places Ramsgate, Margate, and Broadstairs; and on the North Foreland, in the north-east, there is a lighthouse, 85 feet high, visible 19 miles. Pop. (1871) 42,129; (1881) 50,646; (1891) 57,821. See James Simson's *Historic Thanet* (1891).

Thanet Sands. See Eocene System.

Thanksgiving Day, in the United States, is an annual festival of thanksgiving for the mercies of the closing year. Practically it is a national harvest festival, fixed by proclamation of the president and the governors of states, and ranks as a legal holiday. In 1789 the Episcopal Church formally recognised the civil government's authority to appoint such a feast, and in 1888 the Roman Catholic Church also decided to honour a festival which had long been nearly universally observed—though nowhere with such zest as in the New England states, where it ranks as the great annual *family* festival, taking the place which in England is accorded to Christmas. The earliest harvest thanksgiving in America was kept by the Pilgrim Fathers at Plymouth in 1621, and was repeated often during that and the ensuing century; congress recommended days of thanksgiving annually during the revolution, and in 1784 for the return of peace—as did President Madison in 1815. Washington appointed such a day in 1789 after the adoption of the constitution, and in 1795 for the general benefits and welfare of the nation. Since 1817 the festival has been observed annually in New York, and since 1863 the presidents have always issued proclamations appointing the last Thursday of November as Thanksgiving Day.

Thann, a town of Alsace-Lorraine, 13 miles NW. of Mühlhausen by rail. It contains a superb Gothic church, surmounted by a spire of delicate open work, upwards of 300 feet high. Cotton cloths, silks, chemicals, and machinery are manufactured. Pop. 7462.

Tharsis. See Tarshish; and for the modern Tharsis copper-mines, see Rio Tinto.

Thasos, the most northerly island in the Ægean Sea, near the coast of Macedonia. Area, 167 sq. m.; pop. 5200, almost exclusively Greeks. The surface is covered with high, wooded hills (Hypsaria, 3428 feet); indeed Archilochus' description is still applicable—'An ass's backbone overspread with wild wood.' Thasos exports some oil, honey, and timber. In ancient times it was famous for its gold-mines. It was colonised by the Parians, among them the poet Archilochus. It was subdued into obedience to Athens by Cimon (463) and Thrasybulus (407).

Thaumatrope. See Zoetrope.

Theatines, a religious brotherhood of the Roman Catholic Church, which played a very important part in the internal movement for reformation which took place in Central and Southern Italy towards the middle of the 16th century. The founders of this association were a party of friends, Cajetan di Thiene, John Peter Caraffa, at that time Bishop of Theate (from which the Congregation took the name *Theatine*), Paul Consiglieri, and Bonifazio di Colle. Cajetan and Caraffa, in concert with the two other friends named above, having resigned all their preferments, obtained in 1524 a brief of Clement, formally constituting the new brotherhood, with the three usual vows, and with the privilege of electing their superior, who was to hold office for three years. They were forbidden to possess property, and were to subsist entirely upon the alms of the faithful; and yet they were strictly forbidden to beg, or in any way to solicit charitable contributions. Their first convent was opened in Rome, and Caraffa, afterwards Pope Paul IV., was chosen as the first superior. He was succeeded in 1527 by Cajetan, and the Congregation began to extend over Italy, and afterwards into Spain, Poland, Germany, not reaching France till 1644. To their activity, devotedness, and zeal Ranke ascribes much of the success of that remarkable reaction against Protestantism which took place in the later half of the 16th century. Subsequently the Theatine order is confined to Italy. A body of Theatine nuns was established in 1618.

Theatre (Gr. *theatron*, 'a place for seeing,' from *theaomai*, 'I see') means literally any building used for purposes of exhibition; but, popularly, it is generally taken to mean a place devoted to dramatic and musical performances. The classical theatre arose among the Greeks. Its germ was the ring in which dithyrambs and phallic songs were performed by choruses in honour of Dionysus. These were performed in an orchestra or circular dancing place, on all sides of which the spectators were ranged. Later a table was introduced, on which the leader of the chorus stood while he carried on a dialogue with the rest of the choreutæ in the intervals between the choral odes. This was the rudimentary form of the stage. Next an actor, a single actor, was introduced by Thespis, and, as he played many different parts, a tent had to be erected in which he should be able to change his mask and dress. Out of this tent arose ultimately the stage-buildings of the Greeks, which, even after they became elaborate structures of stone, retained the name *skēnē*, 'a booth or tent.' From the remains of various Greek theatres which have been excavated it is possible to reconstruct, at least in its main features, one of these edifices. Fig. 1 shows the design of the theatre at Segesta. The central circle is the *orchestra*, in which the chorus sang and danced, and in the middle of which the altar of Dionysus probably stood. In the oldest theatres the orchestra formed an exact circle, but ultimately the circle was cut on the side next the stage, as

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is shown in the figure. Round the orchestra, in size rather more than a semicircle, the stone seats for the audience rose tier above tier like a large flight of steps. As the theatre was intended to accommodate practically the whole population of the city in which it stood, these rows of seats were of enormous size, the theatre of Dionysus at Athens holding nearly 30,000 persons, and that at Megalopolis being computed to seat 44,000. In order to obtain the necessary slope for the tiers of seats, the Greeks always chose some natural hollow, where the shape of the ground aided the design of the architect. Between the auditorium and the stage were the passages of entrance (*parodoi*), which, in the theatre at Segesta, seem to have been of unusual breadth.

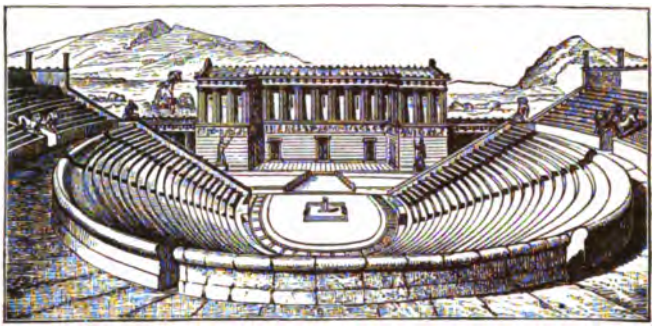

Fig. 1.—Theatre at Segesta, restored.

The stage (*logeion*) was a long, narrow platform, standing, according to the latest theories, about 12 feet higher than the orchestra, and was used by the actors, as distinguished from the chorus. It was bounded at the back and on each side by the wall of the buildings which contained the dressing-rooms of the actors and the other necessary apartments. The stage and back wall were called the *proskēnion*; the side walls, or wings, in each of which was an entrance door, being named *paraskēnia*. A flight of steps connected the stage with the orchestra, and these steps, continued out of sight, were the means by which apparitions from the lower world ascended. The wall of the dressing-rooms, &c., which formed the back wall of the stage, was ornamented with columns, and represented the front of a temple or other building, before which the action of the play was supposed to take place. It had three doors in it, by which entrances and exits were made. When the action of the play required a different scene, the back of the stage was covered with painted curtains or boards, which were practically never changed in the course of a play. At either end of the stage were the *periaktoi*, large, revolving triangular prisms, each side of which bore a different scene, thus providing, as it were, three set of wings. For machinery there was the *ekkyklēma*, a platform on which a tableau, depicting an incident which could not be shown on the stage, was rolled forward from one of the doors of the *proskēnion*, exhibited to the audience, and rolled back again. There was also the *mechane* (*machina*), by which a god could be lowered from heaven to earth, which was probably some sort of crane. From it we derive the phrase of a *Deus ex machinâ*. The curtain, which was not an invariable feature in a Greek theatre, rose from below, instead of falling from above as in modern times. In dealing with the early Greek theatre it must always be remembered that the stage was only of secondary importance, the orchestra being deemed the chief point of interest. The Romans, whose theatres were founded in most respects on Greek models, differed in this point. They transferred all the singing and dancing to the stage, and gave up the orchestra to the most important section of the audience. The most perfect existing specimens of the early Greek theatre are to be seen at Epidaurus, at Aspendus in Pamphylia, and at Athens, where the remains of the theatre of Dionysus, on the rising ground at the foot of the Acropolis, are most interesting and full of information. At Orange, in the south of France, there is a splendid specimen of an ancient Roman theatre.

During the middle ages, when the drama existed only in the form of mysteries and miracle-plays, and was under the management of the church, theatres were not required. Plays were represented generally in cathedrals or monasteries, and the most elaborate scenery ever used was a three-story scaffold to represent heaven, earth, and the nether world. But it would seem that at a very early period there were in England open-air theatres of some sort; for in Perran Round, near Perranzabuloe (q.v.) in Cornwall there exists what must have been a theatre of large extent, with raised seats all round, somewhat after the Greek fashion. With the revival of learning in the 16th century came also a revival of the drama, and theatres began to be built. The earliest was probably a play-house of some sort in the Hôtel de Bourgogne, Paris, which was built about 1548 for the Confraternity of the Passion; but the first regular theatre was that which Bramante constructed at Rome in the Grand Court of the Vatican about the year 1580. Then came the Teatro Olimpico at Vicenza, designed by Palladio, and finished in 1584; while the earliest theatre built on modern lines was constructed by Aleotti at Parma in 1618. In all the early Continental theatres the construction was founded on Greek models, but in England a simpler idea served. Here the earliest dramatic performances took place in booths, in tennis-courts, or in the open court-yards of inns; and it was not till the end of the 16th century that the first permanent building was erected for theatrical purposes. This was 'The Theatre,' built by Burbage in Shoreditch in 1576, which was founded, not on any classical model, but on the inn-yards in which the actors had been accustomed to play. The stage was literally a stage—a platform erected against one side of the building—and on three sides of this platform the spectators stood or sat in the pit (then called the *yard*), while all round it ran the galleries or boxes (then called *rooms*) exactly like the galleries of an inn-yard. There was no provision for scenery. The door at the back of the stage, which communicated with the dressing-rooms, &c., and was the general entrance for the actors, was hung with curtains, and there seem to have been 'traverses,' or curtains running on rods, some distance up the stage, which could be drawn and undrawn to indicate an inner apartment; but the locality in which the scene was laid was indicated only by a ticket stuck up bearing such an inscription as 'A Garden,' 'Thebes,' or 'Rhodes.' *Properties* were, however, largely used to give verisimilitude to the action. For instance, the first items of one of Henslowe's inventories include 'one rock, one cage, one tomb, one hell-mouth, one bedstead.' These properties seem to have been pushed on the stage in the calmest fashion. Thus, in Middleton's *Chaste Maid in Cheapside*, one of the stage-directions is, 'A bed is thrust out upon the stage, Alwit's wife in it;' and a similar action is

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indicated in the stage-direction, 'Enter Anne in bed,' in Davenport's *New Trick to Cheat the Devil*. In the stage there were *traps* apparently to a considerable extent; while behind and on a higher level was a platform which did duty for any elevated part of the supposed scene. Thus, it would represent the walls of a city, a tower, or Juliet's balcony. Malone supposes that, in the play-scene in *Hamlet*, the king and courtiers sat on this raised platform, while the players occupied the regular stage, and acted with their backs turned towards the pit. It seems, however, quite as probable that the arrangement was exactly the reverse, the mimic play being acted on the platform. In the Elizabethan theatre the stage was strewed with rushes, or, upon very special occasions, was matted; and on it the gallants sat on stools, showing their dress and figure to the audience, and destroying, as it seems to us, anything resembling dramatic illusion. The only existing contemporary drawing of the

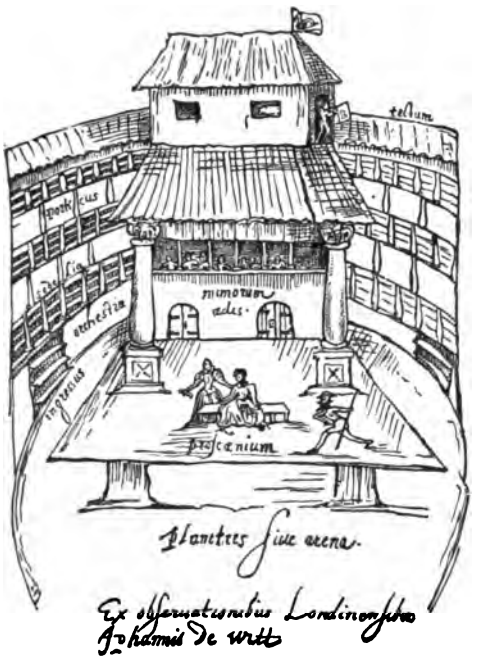

Fig. 2.—The Swan Theatre, London, in 1596.

Elizabethan stage is here reproduced (fig. 2). It is taken from Dr Gaedertz' book on the *Old English Stage* (Bremen, 1888), and represents the Swan Theatre in 1596. The drawing was made by one John de Witt, who visited London in 1596, and whose manuscript diary Dr Gaedertz discovered in the Royal Library at Berlin. As a picture of the stage in the time of Shakespeare it is of infinite value.

After the Restoration, under the supervision of Charles II., who was familiar with the French stage, the English theatre came more into line with the Continental. The stage was gradually withdrawn closer and closer to the proscenium opening, until, by the middle of the 18th century, the appearance of the interior of Drury Lane was not seriously different from that which it presents at this day. In the years immediately following the Restoration many important changes were made in the conditions of the English theatre, the two greatest being the introduction of elaborate scenery and the playing of female parts by women. Up to this time Juliet, Ophelia, and Desdemona had been acted by a beardless boy; while the older female characters were represented by full-grown men. Strange though it seems, great reputations were made by actors in both lines, notably by Edward Kynaston, as a boy-actress, and James Nokes, as an old woman. Movable scenery, which was invented by Baldassare Peruzzi early in the 16th century, had long been used in masques, but it was not till 1661 that it was used to illustrate a regular stage-play in England. It has steadily grown more and more elaborate—a new development of 'set-scenes' being made by Garrick's scene-painter, De Loutherbourg, in 1777—until it has threatened to overshadow the play; and indeed it has been gravely argued that with the introduction of scenery and spectacle began the decay of the drama.

The arrangements of the auditorium of a theatre have changed little during the last two centuries, the chief alteration being the curtailment of the space occupied by the pit. At the Restoration, and all through the 18th century, the whole floor of the house, from the back wall to the rail of the orchestra, was devoted to the pit; but about 1833 Alfred Bunn introduced stalls, which have gradually encroached farther and farther, until in very fashionable theatres the pit is restricted to a few benches far away under the dress-circle, or is abolished altogether, as is the case in opera-houses. In all theatres the floor, whether used for stalls or pit, or both, slopes considerably towards the stage. The various tiers of galleries do the same, except in those theatres where they are not seated with benches, but divided into private boxes. The orchestra, which is now generally located immediately in front of the pit or stalls, was in Shakespeare's time placed in a gallery above the stage. In some theatres the musicians are placed under the stage, whence they discourse muffled music.

In order to realise the modern arrangements behind the scenes, let us imagine ourselves on the stage of a large theatre. Entering by the stage door, we thread our way through narrow passages, blocked by pieces of scenery, until we find ourselves in the *wings*, as the spaces on each side of the stage are named, from the wings or narrow side-scenes which mask the entrances to the stage and continue the picture which the main scene presents. Going forward until we reach the wall which divides the stage from the auditorium, we find, close to the opening through which the stage is seen by the audience, and which is called the *proscenium opening*, the little corner where that important official, the *prompter*, sits. Close to his hand is an elaborate arrangement of bells for signalling to the various parts of the theatre the exact moment when the curtain is to rise, when the orchestra is to cease playing, when the scenes are to be changed, when the traps are to be worked. Beside him is also a brass plate, covered with handles, for lowering or heightening the gas in footlights or elsewhere. The prompter generally, though not invariably, sits on the left of the stage—i.e. the left facing the audience; for right and left are calculated from the actor's point of view, which is naturally the reverse of the spectator's. The side which the prompter occupies is always known as the *P.S.* or *prompt side*, and the other as the *O.P.* or *opposite prompt*. Passing now through one of the *entrances*, as the spaces between the side-scenes are named, we find ourselves on the stage, and realise that we stand, not on a level surface, but on an inclined plane, the slope of which is towards the audience. In front of the stage we see the *footlights*, sometimes also called the *floats*, a row of gas-jets, with strong reflectors, which supply the chief illumination of the actors' figures. For moonlight and other effects they are provided with

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movable screens of coloured glass or coloured cloth, called *mediums*. Within the last few years electric lighting has supplanted gas in many theatres, and great expectations are entertained of the effects which may ultimately be obtained from the new mode of illumination In 1892, at the Electrical Exhibition at the Crystal Palace, some very wonderful effects of the electric light as applied to the stage were shown. Turning our back on the footlights, if no scenery is set we see, away in the darkness at the back of the stage, the *scene-dock*, a large space for storing scenery when not in use. By clearing this dock a great addition can be made to the depth of the stage when spectacular plays demand it. Looking up above our heads we see rows of lights suspended, which are technically called *battens*, and beyond these a wilderness of canvas and ropes and pulleys. But the prompter rings his bell, and a great expanse of painted canvas, called a *cloth*, swings into sight from the regions above the stage; wings are pushed forward to conceal the edges of the cloth; and narrow slips of painted canvas are dropped to mask the top of it. These are called *borders*, and may represent a ceiling, the sky, branches of trees, or whatever is necessary to aid the illusion of the scene. In the modern theatre the cloth has supplanted in a great measure the old contrivance known as *a pair of flats*. These were two frames of stretched canvas, which were run on in *grooves* fixed over the top of the stage and met in the middle, forming two halves of a scene. So seldom are these used now that grooves are not often met with in new theatres, except the short grooves in which the wings run, which are technically known as *forks*. In all first-class theatres the scene generally used is a *set-scene*, which is built so solidly, and reproduces the conditions of nature with such completeness as scarcely to make any demands on the imaginative faculty of the spectators. If a room is represented, the walls and ceiling are built with marvellous solidity; a chandelier hangs from the centre of the ceiling: the doors shut with an unmistakable bang; the windows open and close better than they sometimes do in actual life. In elaborate spectacular plays whole pieces of scenery are raised through large transverse openings in the stage by means of platforms, which are termed *bridges*. These work in and out of the *well*, or *cellar*, a space under the stage nearly as deep as the proscenium opening is high. There is an intermediate floor running round the well, which is called the *mezzanine*. It is about 8 feet below the stage, and from it the *star trap* and the *vampire trap* are worked. These are contrivances for the sudden appearance or disappearance of demons in pantomime. In the vampire trap the actor throws himself against a couple of shutters in the stage, which open to let him through and immediately close again with great force, he landing on a mattress placed to catch him on the mezzanine. The star trap is cut in the stage like a star, with the points meeting in the centre. The actor stands on a little platform on the mezzanine, which is run up with tremendous force by counter weights against the stage. The actor's head opens the points of the star, through which he shoots like an arrow, and before he reaches the stage again the star has closed and is kept solid by the platform on which the actor came up. Farther 'up' the stage—i.e. nearer the back scene—is the *grave trap*, used, for instance, at Ophelia's funeral. These are the chief traps, but the whole stage of a theatre is practically movable, the only immovable parts being the narrow joists, which are called *runners* or *fillets*. Above the stage are the *flies*, large lateral galleries, in which the scene-men work their ropes and pulleys, and from which the lime-light which plays so important a part in the effects of a modern theatre is managed. Higher still is the *gridiron*, an open line of strong beams, from which the various cloths are suspended; and above it again is the *barrel-loft*, in which are placed the windlasses and drums by which the curtain and cloths are worked. At the very top of the theatre, and at the extreme back of the stage, is generally the *paint-room*, in which the scenic artist works. His canvas is stretched on a movable frame, which he drops or raises as he requires, and when a scene is finished it is lowered directly to the stage.

Among famous theatres are the Scala at Milan, the San Carlo at Naples, the opera-houses of St Petersburg, Vienna, and Berlin, and the Court Theatres of Munich and Dresden. Most notable of all architecturally is the Grand Opera-house in Paris, completed in 1875 at a cost, exclusive of site, of £1,120,000; and in Paris also is the most famous theatre in the world for its history and traditions, the Théâtre Français. At Bayreuth is the grand theatre constructed by Wagner to carry out his views on the dramatic art. It is a huge structure, practically all on one floor, with a slightly fan-shaped auditorium, perfectly adapted both for seeing and hearing. But it is practically defective in the important respect that it occupies an enormous space in proportion to the number it holds. The problem of the theatrical architect everywhere is now how to contain the greatest number in the smallest space. A curious expedient is that of a double stage, which is used in the Madison Square Theatre, New York. While an act is in progress the scene required for the succeeding act is set on the second stage, which is above the first; then the stage sinks, and the new scene is in its place ready for the next act.

The art of acting, as understood by the Greeks, had little in common with our present-day theories. The first qualification for the ancient actor, especially in tragedy, was voice, for by that chiefly could he affect his audience. He could get no effects from facial expression, for his feature were concealed by a mask, which was of course immovable. He could not get sudden effects of terror or surprise by active motion and gesture, for he was hampered by a 'make-up' which must have been burdensome in the extreme. First, he wore the *cothurnus*. This tragedy-boot had an enormously thick sole, which raised the hero a considerable height above his fellows, and on which he must have 'clumped' about the stage in the ungainliest fashion. He had to walk with the greatest care to avoid stumbling, and if he fell, apparently had to be lifted on his legs again in somewhat undignified fashion: an accident which, Lucian records, happened to Æschines when acting the part of Œnomaus. To increase his height still further his mask had a high top to it, called the *onkos;* and to prevent his looking lanky he was padded out to a suitable proportion to his height. His dress was almost the ordinary Greek costume, but of very brilliantly coloured material. The comic actors wore masks both in the old and the new comedy, but their costumes were probably less burdensome, although they appear to have been padded in ludicrous fashion. Thus Greek acting must have been in the last degree conventional and unnatural, differing therein very widely from the Roman, which appears to have been highly emotional. In England even up to the time of the Restoration acting must have been, like the Greek, more rhetorical than emotional. This is implied by the position of the stage, with spectators on three sides and an audience of gallants actually seated on it; but after 1660, as the stage gradually came nearer its present condition of a picture

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framed by the proscenium, acting became more in accordance with our modern ideas of dramatic representation.

Licensing of Theatres.—Up to 1843 the only theatres entitled to act regular plays were those which held royal patents—in London, Drury Lane, Covent Garden, and the Haymarket (in summer)—but in that year Bulwer's Act (6 and 7 Vict. chap. 68) established practically free trade in theatricals. By it the Lord Chamberlain was made licensing authority in London and Westminster, Finsbury, Marylebone, Tower Hamlets, Lambeth, and Southwark. Outside his domains the power vested in the justices of the peace. By the Local Government Act, 1888, the authority of the justices was transferred to the county councils, wherever such existed; but in a very great majority of cases these took advantage of a clause in the act which authorised them to delegate back to the justices their licensing powers. In London at present the Lord Chamberlain licenses thirty-seven theatres, as against six licensed by the county council in parts of the metropolis outside his jurisdiction. The Select Committee on Theatres (see Report published in *Times*, 3d June 1892) recommends that the Chamberlain's jurisdiction should in future extend over all theatres in all parts of London.

The following are among the best-known actors in Italy, France, Germany, England, and America:

ITALY.

Modena.
Ristori, Adelaide (b. 1821).
Rossi (b. 1827).
Salvini (b. 1830).

FRANCE.

Molière (1622–73).
Poisson, Raymond (died 1690).
Champmêlé, Mdlle. (1644–98).
Baron (1653–1729).
Lecouvreur, Mdlle. (1690–1730).
Le Kain (1729–78).
Grandval (1710–84).
Préville (1721–99).
Clairon, Mdlle. (1723–1803).
Dumesnil, Mdlle. (1713–1803).
Monvel (1745–1812).
Talma (1763–1826).
Mars, Mdlle. (1778–1847).
Georges, Mdlle. (1787–1867).
Rachel, Mdlle. (1821–58).
Lemaître (1798–1876).
Regnier (1807–85).
Got, François (b. 1822).
Delaunay, Louis (b. 1826).
Coquelin (b. 1841).
Bernhardt, Mdme. (b. 1844).

GERMANY.

Neuber (1692–1760).
Eckhof (1720–78).
Schönemann (1704–82).
Fleck (1757–1801).
Iffland (1759–1814).
Schröder (1744–1816).
Devrient, Ludwig (1784–1832).

GERMANY—*continued.*

Seydelmann (1793–1843).
Devrient, Emil (1803–72).
Dawison, Bogumil (1818–72).
Haase, Friedrich (b. 1827).
Wolter, Charlotte (b. 1834).
Barnay, Ludwig (b. 1842).

ENGLAND.

Burbage, Richard (*c.* 1567–1619).
Alleyn, Edward (1566–1626).
Taylor, Joseph (1585–1653).
Mohun, Michael (died about 1682).
Hart, Charles (d. 1683).
Betterton, Thomas (1635–1710).
Barry, Mrs Eliz. (1658–1713).
Pritchard, Mrs (1711–68).
Garrick, David (1717–79).
Jordan, Mrs (1762–1816).
Kemble, John P. (1757–1823).
Siddons, Mrs (1755–1831).
Kean, Edmund (1787–1833).
Macready, Wm. C. (1793–1873).
Faucit, Helen (b. 1820).
Irving, Henry (b. 1838).

AMERICA.

Cooper, Thos. A. (1776–1849).
Booth, Junius B. (1796–1852).
Duff, Mrs (1794–1857).
Burton, W. E. (1804–60).
Forrest, Edwin (1806–72).
Cushman, Charlotte (1816–76).
Jefferson, Joseph (b. 1829).
Booth, Edwin (b. 1833).

See AMPHITHEATRE, ART, ATELLANÆ, BASQUES, DRAMA, FIRE (Vol. IV. p. 634), MASQUE, MIMES, MYSTERIES AND MIRACLE-PLAYS, OPERA, PANTOMIME; also J. W. Donaldson, *Theatre of the Greeks* (1849; new ed. 1875); Haigh, *Attic Theatre* (1889); J. Payne Collier, *History of English Dramatic Poetry, and Annals of the Stage* (1831; 2d ed. 1879. The statements in this work must be accepted with some degree of caution); Genest, *Account of the English Stage 1660–1830* (Bath, 1832); Doran, *Their Majesties' Servants* (1864; 3d ed. 1888); Ward, *History of English Dramatic Literature* (1875); Fleay, *Chronicle History of the English Stage, 1559–1642* (1890); Hawkins, *Annals of the French Stage to the Death of Racine* (1884), and *French Stage of the Eighteenth Century* (1888); Parfaict, *Histoire du Théâtre François* (1745–49); Lucas, *Histoire Philosophique et Littéraire du Théâtre Français* (1847–63); Devrient, *Geschichte der Deutschen Schauspielkunst* (1848–61); Dunlap, *History of the American Theatre* (1833); George P. Seilhamer, *History of the American Stage before and after the Revolution* (3 vols. 1888–91). Full lists of works relating to the English, Scotch, and Irish theatres will be found in the present writer's *Bibliographical Account of English Theatrical Literature* (1888).

Théâtre Français, or COMÉDIE FRANÇAISE, the theatre in the Palais Royal, Paris, in which the classical drama of France receives its most perfect and artistic representation, dates from 1680, when Louis XIV. combined the actors of the Hotel Bourgogne and Molière's company, and gave them a special organisation and a yearly subvention of 12,000 francs. In 1770 the theatre was established in the Tuileries, in 1782 was removed to a new building where the Odéon now is, and after the troublous times of the revolution was finally established in the Palais Royal. The present constitution dates from 1803. The committee of six, presided over by government officials, names the *sociétaires* (the actors and actresses who belonged to the staff) and the less permanent *pensionnaires*, superintends all financial arrangements, makes a point of reproducing from time to time the really great French plays, and sits in judgment on new plays submitted. The subvention is now 240,000 francs. The *Théâtre Français* is remarkable for perfect study, artistic dignity, and harmonious *ensemble*. Its bicentenary was celebrated with great éclat in 1880. There are histories by Lucas (2d ed. 1863), Chabrol (1884), and Despois (1886).

Thebaine. See OPIUM, Vol. VII. p. 613.

Thebes, the name of a celebrated Egyptian city, formerly the capital of Southern or Upper Egypt; called by the Egyptians Tuabu, by the Hebrews No-Amon, by the Greeks Thebæ, and at a later period Diospolis Magna. It lies in the broadest section of the valley of the Nile, in about 26° N. lat., at a spot where the desert on the west sheers away to the girdling range of the Libyan mountains, leaving a broad plain, partly cultivated, on which stand the famous twin statues, one of which is known as the 'vocal Memnon' (q.v.), and behind them the temples grouped about the modern districts of Kurna and Medînet-Habû. The Nile divides this western part or Necropolis of Thebes, anciently called the 'Libyan suburb,' from the extensive ruins now known by the names of the villages Luxor (el-Uksur, 'the palaces') and Karnak which stand on the eastern bank, with the low range of the Arabian hills for a background. The traditional foundation of Thebes goes back to the 1st dynasty, but no buildings have hitherto been found earlier than some slight constructions of the 11th dynasty, 2500 B.C., who appear to have founded the original temple of Amen-Ra, the special god of the city. Its most flourishing period was under the 18th, 19th, and 20th dynasties, or from about 1600 to 1100, when it had supplanted Memphis, the ancient capital of the Pharaohs. The central situation of Thebes secured it from the attacks of the northern enemies of Egypt, and contributed to its prosperity; and here the worship of Amen-Ra arose in all its splendour; magnificent palaces and temples were built in its different quarters by the great monarchs of the Theban dynasties, and were added to by later kings, down to the time of the Ptolemies and Antonines, to the 2d century A.D. It was enriched by the spoils of Asia and the tributes of Ethiopia, and its fame and reputation had reached the early Greeks. Homer describes it by the epithet of Hundred-gated (ἑκατομπύλαι Θῆβαι), doubtless in allusion to the gates or pylons of its temples, for Thebes was never a walled or fortified city. In the plenitude of its power it sent forth an army of 20,000 war-chariots; but about 1100 B.C. the Bubastite and Tanite dynasties removed the capital again to the north, to Sais and Memphis,

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and thenceforth Thebes declined in importance. At the Persian conquest in the 6th century B.C. Cambyses obtained a spoil of nearly £2,000,000 from the city, and destroyed many of its noblest monuments. The foundation of Alexandria still further injured it; and at the time of Strabo Thebes was only a cluster of small villages. Its temples, tombs, and ruins were frequently visited by Greek and Roman travellers, including the Emperor Hadrian. At a later period a considerable Christian population lived there under the empire; but at the Arab invasion the inhabitants fled to Esné. Thebes is now inhabited only by Fellahîn, by a few officials, and by the migratory visitors to the three hotels at Luxor.

Of the monuments on the west or Libyan side the principal are the three temples of Seti I. and Rameses II. and III., known respectively as El-Kurna, the Rameseum (or Memnonium), and Medînet-Habû. Close to the Rameseum is the fallen and broken colossus of the founder, the largest statue in Egypt, originally nearly 60 feet high, celebrated in Shelley's sonnet as that of Osymandyas, whose palace the temple was believed to represent. Near by are also some remains of two temples of Amenoph III., whose two colossal statues still survey the green fields in front. Some way behind the Rameseum, on a spur of the hills, is the terraced temple of Queen Hatasu (18th dynasty), known as Deyr-el-Bahri, near which a remarkable series of thirty-nine royal and priestly mummies, papyri, &c. were found by Emil Brugsch in 1881. At Medînet-Habû is a pile of buildings, of which the chief is the great temple of Rameses III. (the Rhampsinitus of Herodotus), with sculptures representing his victories over the Philistines, the life in his harem, the riches of his treasury, and a calendar with inscriptions dated in the twelfth year of his reign. Near here, to the north-west, are the cemeteries of the sacred apes, and further on the valley of the Tombs of the Queens, consisting of seventeen sepulchres, supposed to be the tombs of the Pallacides of Amen, mentioned by Diodorus and Strabo. Near them, among the hills, are the Bibân-el-Mulûk, or Tombs of the Kings of the 19th and 20th dynasties, sixteen in number, the most interesting of which are those of Seti I., called Belzoni's, after its discoverer, and of Rameses III., named by Bruce the 'Harper's tomb.'

On the east bank the chief monuments are at Luxor, the beautiful temple of Amenoph III. (18th dynasty), added to by Rameses II., with its well-known obelisk, the fellow of which was removed to the Place de la Concorde at Paris; and the still more magnificent temple, or rather group of temples, at Karnak, the sanctuary of which, built by Osirtasen I. of the 12th dynasty, was added to by the monarchs of the 18th. The most remarkable part of this wonderful mass of pylons, courts, and obelisks is the great hall, 170 feet by 329 feet, built by Seti I. and Rameses II., with its central avenue of twelve massive columns, 62 feet high and 12 feet in diameter, and its 122 other columns, and two obelisks (originally four), one of which is the tallest in Egypt, 108 feet high. On the walls the sculptures tell the glorious history of those two warrior kings, how they fought against the Hittites and the Ruten, and the Arabs and the Syrians, and the people of Armenia, and took from them their strong cities. Here, too, is the so-called Portico of the Bubastites, built by Shishak I., recording his expedition against Jerusalem, 971 B.C.

The Thebaid, the territory of Thebes, was a term applied to various areas at various times, but generally to one of the three main divisions of Egypt. It is specially familiar to us as being a favourite place of retreat for Christian hermits.

Thebes, the principal city of Bœotia in ancient Greece, situated on the slopes of Mount Teumessus, and between two streams, the Dirce and the Ismenus, about 44 miles to the north-west of Athens. Its acropolis continued to be called Cadmeia from the legend that it was founded by a colony of Phœnicians under Cadmus. Here were born Dionysus and Hercules, Tiresias and Amphion; this was the scene of the dark tragedy of Œdipus, the war of the Seven against Thebes (see ADRASTUS), the terrible vengeance of the Epigoni. But the story of the city enters the world of history in the dispute between Thebes and another Bœotian city, Platæa, which involved the former in an unsuccessful war with Athens, and began that bitter enmity that never died out till the death of Greek liberty itself. During the Persian war Thebes sided with the Asiatic invader, but Sparta, jealous of Athens, interfered to prevent the unworthy city being deprived of her supremacy over the other Bœotian cities. When the Peloponnesian war broke out Thebes took part with Sparta, and at its close was eager for the destruction of Athens; but it soon began to dread the overgrown power of its ally, and sheltered the Athenian exiles from the rule of the Thirty Tyrants. Hence arose a bitter antagonism between Thebes and Sparta, and a varying struggle, which closed with a short period of Theban supremacy over all Greece, won by the glorious victory of Epaminondas at Leuctra (371), but ended by the hero's death in the moment of victory at Mantinea (362). The eloquence of Demosthenes induced Thebes to unite in opposition to the encroachments of Philip of Macedon; but it was too late, and in 338 B.C. the battle of Chæronea crushed the liberties of Greece. After Philip's death the Thebans made a fierce but unsuccessful effort to regain their freedom, but their city was taken by Alexander, levelled to the ground, and the entire population sold into slavery (336). In 316 it was rebuilt by Cassander (whose walls were traced by E. Fabricius in 1888); and it was taken by Demetrius Poliorcetes in 290. It was plundered by Sulla, and in Strabo's time was a miserable village. During the 11th and 12th centuries it revived through its silk manufacture, but under the Turks again declined, though its modern representative, Thiva, has still a population of about 4000. See E. Fabricius, *Theben* (1891).

Thecla, a virgin saint of the early church, a member of a noble family of Iconium in Lycaonia, where she was converted by the preaching of St Paul, and, having devoted herself to a life of virginity, suffered a series of persecutions from her intended bridegroom, as well as from her parents. She is said to have died at the age of ninety in Seleucia. The apocryphal *Acts of Paul and Thecla* were edited by Tischendorf in the *Acta Apostolorum Apocrypha* (Leip. 1851). See Lipsius on the Apocryphal Acts (Brunswick, 1886), or the monograph by Schlau (Leip. 1877).

Theed, WILLIAM (1804–91), sculptor (son of William Theed, R.A., sculptor, 1764–1817), is known by the statues of Newton at Grantham, Lord Derby at Liverpool, Peel at Huddersfield, and the Africa group on the Albert Memorial.

Theft is the unlawful taking away of another man's property. To constitute the crime three things are necessary—the *animus furandi*, or intent to steal, the *asportavit*, that is, the goods must be removed from the owner's possession, and this must be done *domino invito*, against his will. The thing stolen need not be in the possession of the owner; thus, if a man finds lost property, and, knowing to whom it belongs, converts it to his own

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use, he is guilty of the offence. Again, if a man receives an article for a special and temporary purpose and appropriates it he commits theft. A guest at an inn making off with the vessels or plate brought to him during a meal is an example. Again, the owner may be induced to part with the property by a false pretence; this would be theft according as he did not or did intend to transfer the right to the goods. Thus, if A got from B a horse on the pretext that he wished to show it to a possible customer, A would be guilty of theft if he kept the animal; but if he obtained possession by representing that he wanted it for himself and would pay for it next day, a payment he could not and did not intend to make, he would be guilty of obtaining goods by false pretences. Both parties may in the first instance be deceived or mistaken, but the subsequent conduct of one may make him a thief. Thus, A agreed to lend B a shilling; the coin that passed was a sovereign. B finding this out later kept it; after some doubt he was found guilty of theft. If an article is pledged it is theft if either of the two parties to the contract take possession of it to the detriment of the other; so the partner of a firm or the member of a corporation may steal the partnership or corporation property, but a married woman living with her husband does not commit theft when she converts his property to her own use. If the theft be from the person, and accompanied by violence or threats, it is robbery; if committed by a clerk or servant, upon property received by him on account of his master, it is embezzlement. To buy or accept, knowingly, stolen goods is not theft, but receiving—a crime punishable with fourteen years' penal servitude or less, according to the nature of the theft. The following cannot be stolen: Land and things permanently attached thereto, or documents relating to the title thereof; running or standing water not stored for use (gas and electricity may be stolen); animals running wild, corpses, and things abandoned by their owners. Child-stealing, viz. the abduction of children under the age of puberty, is an offence, but as committed against the person is not properly theft. In England formerly theft was either *grand* or *petit* larceny. The latter was restricted to the taking of property to the value of one shilling or less. If the value was greater it was the former, and was punishable between the time of Edward I. and 1827 with death. Very severe sentences may still be inflicted for various kinds of theft. Thus, to steal a will or a letter in the custody of the post-office is punishable with penal servitude for life.

See Stephen's *Digest*, *General View*, and *History of the Criminal Law*. See also STOLEN GOODS.

Theine. See TEA.

Theism (Gr. *theos*, 'God'), etymologically equivalent to belief in a god or gods, and as such opposed to Atheism (q.v.), is now usually understood to mean the doctrine of the One, supreme, personal God, 'in whom we live, and move, and have our being'—as distinguished from Polytheism (q.v.), which recognises more gods than one; from Pantheism (q.v.), which denies the divine personality; from Agnosticism (q.v.), which denies that we can know anything of God; and from Deism (q.v.), which, etymologically equivalent to Theism, is generally defined as recognising the personality of God, but denying His providence and active presence in the life of the world (though it should be remembered that many deists would not have admitted that this was their doctrine). Deism further explicitly rejects revelation and trinitarian conceptions of the godhead, while Theism may or may not accept these doctrines. But the term theism was often used as equivalent to deism with its negative postulates: and when Theodore Parker speaks of 'Theism,' or when the Brahmo-Somaj is called the 'Theistic Church of India,' or a book is published with such a title as *Theistic Devotions*, that kind of theism is also meant which either denies or at least does not include Trinity, incarnation, inspired and infallible revelation, or miracle.

Various views of the origin of the notion of God, and the relation of the monotheistic religions to nature-worship, animism, spiritism, and polytheism, have been indicated in the article Religion (q.v.); together with several definitions of religion as man's attitude towards God.

Theism as the doctrine of the nature and attributes of God covers a large part of the field of theology and speculative philosophy. But in practice it is usually restricted to the maintenance of the thesis that God may be known; the history of the origin and development of the idea of God; and the statement, criticism, and defence of the arguments for the existence of God. The main part of its work is apologetic, in opposition to the hostile systems and theories, rather than a scheme of systematic Theology (q.v.). No competent apologist now stakes the existence of God on any one argument, or exhibits the proof as a series of syllogisms. It is rather maintained that the study of human history, of human nature especially on its moral and spiritual side, and of the world as far as science reveals it to us make for the existence of a God, demand such a postulate as the key to the universe, and render the belief in a personal God greatly more probable than any other thesis—a subject vastly too wide for discussion here. But it is necessary to name what are often referred to as the four great arguments for the existence of God. (1) The *ontological* argument first formulated by St Anselm proceeds from the notion of a most perfect being to infer his existence; without actual existence the idea would fall short of perfection. The argument was re-stated in a different shape by Descartes (q.v.) and by Samuel Clarke, and, though very contemptuously treated by Kant, is still an element of the argument that without a God the world is a chaos.

(2) The *cosmological* argument, employed by Aristotle, Aquinas, and a host of Christian authors, is an application of the principle of Causality (q.v.). We cannot conceive an infinite regression of finite causes; therefore beyond the last or first of the finite causes is the Infinite. From motion the argument is to a mover.

(3) The *teleological* argument, or argument from design, proceeds from the order and arrangement of the universe, the reign of law and beauty and adaptation, to the intelligent and supreme fountain of order. This is the most familiar of the arguments, especially on the lines laid down by Paley.

(4) The *moral* argument was that relied on by Kant (q.v.) when he destructively criticised the other three, and forms a part of most modern theistic arguments. God is a postulate of our moral nature; and the moral law in us implies a lawgiver without us.

See, besides general works on apologetics and dogmatic theology, Professor Flint's *Theism* (1877; 4th ed. revised, 1889); Harris, *The Philosophical Basis of Theism* (New York, 1883); *The Grounds of Theistic and Christian Belief* (New York, 1883); the Duke of Argyll, *The Reign of Law* (1866; 19th ed. 1890); Kant's *Critique of Pure Reason*; Mill's *Three Essays*; Janet's *Final Causes* (trans. 1878); Hutchison Stirling's Gifford Lectures (1890).

Theiss (Hun. *Tisza*), an important affluent of the Danube, and the chief river of Hungary, rises by two streams, the Black Theiss and the White Theiss, in the Carpathian Mountains. It winds 750 miles north-west, south-west, and finally southward, joining the Danube after running parallel to

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it for 300 miles. The Theiss has several large and navigable affluents, as the Maros and Bodrog. The lower part of its course is sluggish, and it has often inundated the plains, flooding the cities on its banks, such as Szegedin (q.v.). Much has lately been done to regulate the course and drain the marshes on its banks. The Theiss is extraordinarily rich in fish.

Thellusson, PETER, banker and millionaire, was the son of Isaac de Thellusson, ambassador of Geneva at the court of Louis XV., and settling in London as a merchant about 1750, acquired enormous wealth, which at his death (27th July 1797) he disposed of by a will that led to a special act of parliament and much litigation. After bequeathing large fortunes to all the members of his family, he left the residue of his wealth (estates worth £4500 a year and personal property to the amount of £600,000) to trustees, to accumulate during the lives of his three sons and of all their sons. The accumulated fund (estimated to be likely to produce some £19,000,000) was then to be used to purchase estates for the eldest lineal descendant of his three sons. The will was contested by the heirs at law, but affirmed in the House of Lords in 1805; though meanwhile the Thellusson Act (see PERPETUITY) had been passed (1800), restraining testators from devising their property for accumulation for more than twenty-one years. Thellusson's last grandson died in February 1856; and there was then a lawsuit as to whether the property should go to the eldest male descendant of Thellusson or to the eldest male descendant of Thellusson's eldest son. To the latter (Lord Rendlesham) it was finally adjudged on appeal to the House of Lords (9th June 1859); but, by reason of the large expenses, the total sum inherited was said not much to exceed the sums bequeathed by the testator.

Thelwall, JOHN (1764–1834), tailor's apprentice, law student, man of letters, and radical. See Life by his widow (1837).

Themis, in Greek Mythology, one of the Titanides, the daughter of Uranus and Gē, was after Metis married to Zeus, and bore him the Horæ—Eunomia ('Equity'), Dikē ('Justice'), and Eirēnē ('Peace'); also the Moirai or Fates. She was regarded as the personification of order and justice, or of whatever is established by use and wont; and as such was charged by Zeus to convoke the gods, and preside over them when assembled, being likewise represented as reigning in the assemblies of men. In art Themis holds a cornucopia and a pair of scales. See Ahrens, *Ueber die Göttin Themis* (Han. 1862–64).

Themistocles, the great Athenian general and statesman, was born about 520 B.C. His father, Neocles, belonged to an undistinguished family of the middle class; his mother was a Carian. Ambitious from his cradle, he used his archonship of 493 for the promotion of his political plans. He saw what was best for Athens when he turned the attention of his countrymen to the sea and convinced them that a powerful fleet was absolutely necessary for their welfare. A large sum of money, the produce of the silver-mines of Laurium, which it was proposed to divide among the people, was devoted to its construction. During the war with Persia which followed Themistocles, commander of the Athenian squadron, which numbered 200 of the 324 vessels engaged, to avoid dissension was content to serve under the Spartan Eurybiadas, a man of narrow mind and hopeless obstinacy. On the eve of Salamis it required all the influence of Themistocles' vehement personality and threats to induce his timid superior and colleagues to await the attack of the enemy. In his eagerness to precipitate a collision, he sent by night a messenger to urge the Persian generals to make an immediate attack, as the Greeks had resolved on retreat. He thus provided for himself, whatever the issue might be. Intimation of the Persian advance was brought at nightfall by his rival Aristides, who had been ostracised in 483 B.C. The Peloponnesians refused to continue the pursuit of the Persians beyond Andros. From that place Themistocles sent a second message to Xerxes urging him to hasten back before the Greeks carried out their project of breaking down the bridges. Though later Themistocles may have found it convenient to interpret this act differently, it was honestly sent at the time with the intention of inducing Xerxes to leave Attica. The victor of Salamis was now the foremost name in the minds and mouths of men. The rebuilding of the walls of Athens by his advice on a scale far larger than anything in existence aroused great uneasiness among the allies of Sparta, but, by a series of adroit stratagems, Themistocles succeeded in cajoling the ephors till the walls had reached a height sufficient for defence. But his popularity was now waning, and the Spartan faction in Athens was plotting his ruin. Plutarch tells us that he provoked the anger and resentment of the citizens by his insufferable arrogance. In 471 B.C. ostracism was demanded, and he was banished from Athens. Argos was his first retreat, but so long as he remained there Sparta could have no security or peace. His condemnation on the false charge of implication in the treason of Pausanias drove him from Argos. He fled to Corcyra, and after a series of hairbreadth escapes was compelled to seek shelter in Asia. Artaxerxes received his suppliant with the greatest favour, and listened with attention to his schemes for the subjugation of Greece. It is said that the young king was so affected with joy that he was heard at night to cry thrice in his dreams, 'Themistocles the Athenian is mine.' After the Persian fashion, the town of Lampsacus was appointed to supply him with wine, Magnesia with bread, and Myus with other provisions. At Magnesia he lived securely till about 453 B.C.

'In a word,' says Thucydides, 'Themistocles, by natural force of mind and with the least preparation, was of all men the best able to extemporise the right thing to be done.' Of his moral character the great historian says nothing. But if his patriotism seems at times to have been but a larger kind of selfishness, it must be remembered that Themistocles was possessed of the conviction that no one could realise the dream of a great Athenian empire but himself. The sentence passed upon him was a bitter return for the unparalleled services he had rendered his country, and, due as it was to Spartan influence and jealousy, proved all the harder for a man of spirit to bear.

Theobald, LEWIS, an early Shakespearian critic, was born about 1688, the son of an attorney at Sittingbourne in Kent, and was bred to his father's business, but early took to literature, publishing in 1714 a tragedy entitled *Electra*, followed by twenty equally forgotten dramas. He published thirty papers under the name of 'Censor' in *Mist's Journal* (1715), and eighteen months later commenced the *Censor* as a separate tri-weekly paper, which extended to sixty-six more numbers. In 1726 he published his pamphlet, *Shakspere Restored, or a Specimen of the many Errors committed as well as unamended by Mr Pope in his late edition of this poet*, which the poet repaid by immortalising him as the original hero of the *Dunciad*. Theobald could not compete with his adversary in wit, but he proved himself a much more competent editor of Shakespeare by his edition in 1733 (7 vols.), which quite extinguished

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that of his rival. He died in September 1744. Theobald was often very happy in his suggested emendations, and had the crowning merit of having much higher respect for his text than many much more brilliant men.

Theobalds, in Hertfordshire, near Waltham Cross, 13 miles N. of London, a former mansion built by Lord Burghley, who here often entertained Elizabeth. Exchanged for Hatfield (q.v.) in 1607 by his son the Earl of Salisbury with James I., whose favourite residence it was, and who died here, it was demolished in 1650 and 1762. The present Theobalds Park, on the other side of the New River, is an 18th-century mansion, the seat of the Meux family. Here Temple Bar (q.v.) has been re-erected.

Theobromine. See COCOA.

Theocracy, literally, 'government by God,' is the name given to that constitution of a state in which the Almighty is regarded as the sole sovereign, and the laws of the realm as divine commands rather than human ordinances. Under such a view the priesthood necessarily become the promulgators and interpreters of the 'divine commands,' and act as the officers of the invisible Ruler. The typical example of a theocracy is that established by Moses among the Hebrews.

Theocritus, the pastoral poet of Greece, was born early in the 3d century B.C. in Syracuse. The dates of his birth and death are not known, and we know but little of his life. He was educated at Cos under Philetas, a poet then famous, of whom Theocritus speaks with high respect (Id. 7). Cos then possessed a school of medicine, and Theocritus repeatedly mentions friends of his own, Nicias and Philinus, who were physicians, and whom probably he first met during their student days. Probably here also his friendship with the poet Aratus was formed. It is certain that a number of Theocritus' poems were composed between the years 270 and 250 B.C. He lived for a long time at the court of Ptolemy Philadelphus in Alexandria, where he wrote several of his idylls. In his pastoral poems Theocritus struck out an entirely new form of literature, which lives and is fresh for ever. Many of the poems which Suidas attributes to him are lost, and those which we have appear to be a selection from his writings. There is some question as to the authenticity of the thirty poems which we have. They show great differences of style, but this is quite consistent with the versatility of his genius. We do not question that dramas so widely different as *Prometheus Bound* and *Agamemnon* were written by one poet. His poems fall under three classes—half-epic, mimic, and idyllic. Probably the half-epic poems were the earliest written. The form of poetry most popular in Theocritus' day was the epic, as the *Alexandra* of Lycophron and the *Argonautica* of Apollonius Rhodius, both contemporaries of his, survive to show us, and during his youth Theocritus was most likely to be influenced by the tendency of the time. He has written a series of poems dealing with heroic legend, the infant Hercules, Hercules at the stables of Augeas, his encounter with the Nemean lion, and the episode of the Argonautic expedition when Hercules lost his young squire Hylas. In another very characteristic poem he describes the fight between the Greek hero, Polydeuces (a kinsman of Hercules), and the barbarian giant who is defeated in boxing, and made to promise to respect the rites of hospitality for the future; the combat is described with the utmost spirit. These poems are full of the spirit of Greek chivalry, and show Theocritus to be a Hellene at heart. Possibly he may have contemplated an epic poem on the exploits of Hercules, the great Dorian hero, and these poems may be fragments of it. Some of the poems, such as the 2d, 14th, 15th, and 21st, are dramatic scenes, and have been called mimic because they closely resemble in form the mimes of the Syracusan poet Sophron (Plato's favourite author), who wrote with great dramatic power dialogues probably in rhythmical prose, with male and female characters. Theocritus' famous 15th Idyll, *The Ladies of Syracuse*, is said to be copied from Sophron. It describes the visit of a Syracusan lady and her friend, both living in Alexandria, to the festival of Adonis. Nothing could be more natural than this poem. Lang says truly, 'the chatter of the women has changed no more in 2000 years than the song of birds.'

The Doric settlers in Sicily delighted in poetry resembling the ballads, love-songs, and dirges, and the improvised poems in answering couplets which are still sung in Sicily and in Southern Italy. Theocritus raised this rude pastoral poetry into a new and perfect form of literature. His short poems dealing with pastoral subjects, and, like paintings, representing a single scene, came to be called Idylls (*eidullia*) or 'little pictures,' a name probably not used by Theocritus himself. It is possible that the reaction between experience of country life on the Sicilian coast or on the slopes of Etna, and of life in a great and refined Greek city like Syracuse, and later in an enormous metropolis like Alexandria, was necessary to produce such poetry. Theocritus writes of the country because he loves it. His countrymen are not mere lay-figures dressed up with crook in hand. They are genuine country-folks, and show that combination of simplicity and love of nature with shrewdness in making a bargain which is found in the peasant everywhere. Every touch in these poems is natural and lifelike. After reading Theocritus the *Eclogues* of Virgil strike us as artificial. Take for instance the *Journey to the Feast*, which tells how the poet and two friends took their way from Syracuse to join a harvest-home party. On the road they overtake Lycidas, a goat-herd. To beguile the way Lycidas and Theocritus recite short poems of their own composition. Keats has written nothing more luscious than the description of the orchard-nook where the feast is held, which concludes the poem: verses which exhale the very mellowness and scent of summer. 'All things breathed the rich scent of summer, the scent of the time of ripe fruits.' Take again the poem of *The Fishers*—two old fishermen in their poor wattled cabin, filled with the implements of their craft, wake at midnight, and one of them tells how he dreamed that he caught a golden fish, and swore never to tempt the sea again; a poem which, in its sympathy with poverty and the toilers of the sea, is worthy of the author of *Les Misérables*. Strange power is shown in the idyll on the love of Polyphemus the Cyclops for Galatea. Nothing could seem further from love than the Cyclops, yet Theocritus makes us feel for the monster and pity him in the humility of his love and his hopeless passion. Hardly anywhere is there truer pathos than this poem contains. One of Theocritus' greatest charms is his power of landscape-painting. His landscapes bask in full sunlight. Kingsley says truly, 'Theocritus floods the whole scene with the gorgeous Sicilian air like one of Titian's pictures.' When Theocritus lived, Greek national life had ceased to be; imperial Athens was no longer; Greek religion had lost its vitality. No poet of Pericles' day could have written the fulsome eulogy on Ptolemy's repulsive marriage in the 17th Idyll. Had Theocritus lived in the age of Pericles, no doubt a stronger and more bracing air would have blown through his Arcadia, which remains for us a country good to

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wander in, a sunny realm where men labour without care, and where life is undisturbed by anxious questionings. Dealing with pastoral life, Theocritus comes most into comparison with Robert Burns, who has far more depth, humour, and passion, but is without Theocritus' sense of beauty. Compared with the Scottish poet, Theocritus stands out at once as the man not only of genius but also of highest culture, accustomed to refined city ways, while the *comparative* roughness of Burns shows him as the man born and bred from earliest years in the 'pastoral world far from city and mart.' The power of Theocritus is seen in his influence over other poets. Virgil imitates him closely in his *Eclogues*. Tennyson has been deeply influenced by him: poems like *Œnone* and the idylls of country life remind us both in form and spirit of the Greek poet.

There are editions by Valckenaer (1810), Wüstemann (1830), Meineke (1856), Wordsworth (2d ed. 1877); two editions by Fritzsche, the larger with Latin notes (Leip. 1865–69), another with German notes and glossary (reprinted 1857); translations in verse by Chapman (1866) and Calverley (1869). Idylls 7 and 11 are exquisitely translated by Leigh Hunt (*Jar of Honey*). Prose translation by A. Lang (1889), with introduction.

Theodicy (Gr. *theos*, 'God,' and *dikē*, 'justice'), a name given to the exposition of the theory of Divine Providence, with a view especially to the vindication of the attributes, and particularly of the sanctity and justice of God in establishing the present order of things, in which evil, moral as well as physical, so largely appears to prevail. The name is of modern origin, dating from the close of the 17th century, or the beginning of the 18th century; but the theory, as well as the mysterious problem which it is meant to resolve, is as old as philosophy itself (see EVIL). The first to consider the question in its integrity was the celebrated Leibnitz (q.v.); and see OPTIMISM.

Theodolite, an instrument much employed in land-surveying for the measurement of angles horizontal and vertical, is neither more nor less than an altitude and azimuth instrument, proportioned and constructed so as to be conveniently portable. As in all instruments in very general use, the variations in its construction are almost numberless; but its main characteristics continue unaltered in all forms. It consists essentially of two concentric circular plates of copper, brass, or other material (the upper plate, or *upper horizontal*, either being smaller, and let into the lower, or *lower horizontal*, or the rim of the lower raised round the outside of the upper), moving round a common axis, which, being double, admits of one plate moving independently of the other. Upon the upper horizontal rise two supports, bearing a cross bar, which is the axis of a *vertical circle* moving in a plane at right angles to the former. This latter circle either has a telescope fixed concentric with itself, or a semicircle is substituted for the circle, and the telescope is laid above and parallel to its diameter. The circles, as their names denote, are employed in the measurement of horizontal and vertical angles. For these purposes the outer of the horizontal circles is graduated, and the inner carries the index-point and the Verniers (q.v.); the vertical circle is also graduated, and the graduations are generally read off by an index-point and vernier firmly attached to the supports. The upper horizontal is furnished with two levels placed at right angles to each other, for purposes of adjustment, and has a compass-box let into it at its centre. The stand consists of a circular plate supported on three legs, and connected with the lower horizontal by means of a ball-and-socket joint; the horizontal adjustment of the instrument being effected by means of three or four (the latter number is the better) upright screws placed at equal distances between the plates. The telescope is so fixed as to be reversible, and the adjustments are in great part similar to those of other telescopic instruments, but are too numerous and minute to be here detailed. Both horizontal plates being made, by means of the screws and levels, truly level, the telescope is pointed at one object, and the horizontal angles read off; it is then turned to another object, and the readings off from the graduated circle again performed; and by the difference of the readings, the angular horizontal deviation is given; and when vertical angles are required, the readings are taken from the vertical circle in a similar manner. For the much-disputed etymology, see *Notes and Queries* for 1884, &c.

Theodolite:
A, B, the horizontal limbs; *d*, *d*, spirit levels; E, a magnifier to read off the degrees; *b*, *b*, *b*, milled screws to adjust the instrument, and set in level; H, a clamping screw; I, a slow-motion screw, by which the instrument is moved more exactly than could be done by the hand; *i*, *i*, clips, to reverse the telescope by screws, *j*, *j*; K, L, frames into which the pivots are placed, on which the vertical arc, M, is turned round, and on which the telescope is fixed; N, a microscope for reading off the degrees; P, a slow-motion screw, by which the vertical arc and telescope are moved; Q, a milled screw for moving the object-glass of the telescope.

Theodora, the famous consort of the Byzantine emperor Justinian I., was, according to the dubious evidence of Procopius, the daughter of Acacius, a bear-ward at Constantinople, and had already been by turns actress, dancer, and shameless harlot, when she won the heart of the austere and ambitious Justinian, to become in succession his mistress, his wife, and the sharer of his throne (527). There was a law which forbade a member of the senate to marry an actress, but Justinian cleared the way by repealing it. Theodora was of less than middle height, and her complexion was pale, but such was her beauty that Procopius tells us 'it was impossible for mere man to describe her comeliness in words, or imitate it in art.' Never thereafter did the breath of scandal touch her name; she became Justinian's trustiest counsellor, bore a chief share in the work of government, and saved the throne by her high courage at the crisis of the Nika riots (532). 'Now every man must die once,' said she in council, 'and for a king death is better than dethronement and exile. . . . If you wish, O emperor, to save your life, nothing is easier: there are your ships and the sea. But I agree with the old saying that "empire is the best winding-sheet."' She lavished her bounty on the poor, and especially upon the unfortunate of her own sex, and died at forty (548), her slender and graceful frame worn out by the anxieties of state. Her character descended to history unspotted until the appearance (1623) of the *Secret History* of Procopius, the work of a man who had enjoyed the full favour and confidence of the court, and had in his other writings

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openly extolled the triumphs and the wisdom of Justinian and Theodora, whose reputation he was the while labouring in secret to destroy. His stories satisfied his first editor, Nicholas Alemannus, and later Gibbon and Dahn; but it may be remembered that there is not a word of Theodora's profligacy in Evagrius or Zonaras, and moreover that, when a man owns that elsewhere he has purposely denied or concealed the truth, it may at least be said that we are entitled to hesitate about the value of his testimony at all.

See Antonin Débidour, *L'Impératrice Théodora* (Paris, 1885); C. E. Mallet's article in *Eng. Hist. Rev.* (vol. ii. 1887); F. Dahn's *Prokopius von Cäsarea* (Berlin, 1865); Bury's *Later Roman Empire* (1889). Sardou's drama on the theme (1884) revived interest in the puzzling personality and character of the great empress.

Theodore OF MOPSUESTIA, a great exegete of the early church, was born at Antioch about the middle of the 4th century. He was the friend of Chrysostom and the pupil of Libanius, but it was Diodorus of Tarsus from whom he imbibed his zeal for biblical studies. About the year 383 he became a presbyter in Antioch, and about 392 he was chosen Bishop of Mopsuestia in Cilicia. He died at peace with all men in 428 or 429. Theodore wrote commentaries on almost all the books of Scripture, of which only remain, in the Greek, that on the Minor Prophets; in Latin translations, those on the lesser epistles of Paul, besides many fragments, especially on the epistle to the Romans. As an exegete he eschews the allegorical method, adopting the literal meaning, and he takes into consideration also the historical circumstances of the composition, and assumes varying degrees of inspiration. When the Nestorian controversy broke out his polemical writings, which seem to have offended by a characteristically sober tone, were attacked, and after a century of fanatical agitation were formally condemned by Justinian in the *Tria Capitula* (544). The fifth œcumenical council—that of Constantinople in 553—confirmed the emperor's condemnation, and Theodore's name vanished from the list of orthodox writers.

The Greek fragments of his New Testament commentaries were collected by Fritzsche (1847). The Pauline commentaries were edited by Swete, with admirable prolegomena (Camb. 1880–82). The commentary on the Minor Prophets was edited by Wegnern (1834) and Mai (1832, 1854), the Syriac remains by Sachau (1869). See Kihn, *Theodore von Mopsuestia u. Junilius Afric., als Exegeten* (Freib. 1880).

Theodore, 'king of Corsica,' otherwise Baron Theodore de Neuhoff, son of a Westphalian noble in the French service, was born at Metz in 1686, was himself successively in the French, Swedish, and Spanish service, was ruined in Law's speculations, and after leading an adventurer's life settled at Florence in 1732. As representative of the Emperor Charles VI., he was induced by Corsican acquaintances to head a Corsican rising against the Genoese; and with the support of Turkey and a ship and munitions from the Bey of Tunis landed in Corsica in March 1736, and was crowned Theodore I. He was in a few months driven to flight, as he was again on a second attempt in 1738, and on a third in 1743. After many wanderings he settled in London in 1749. Imprisoned by his creditors, he was liberated by a subscription supported by Walpole, but died soon after, 11th December 1756. In Spain he had married an Irish lady, daughter of the Earl of Kilmallock. His only son by her, known as Colonel Frederick, wrote a book on Corsica, and at the age of about seventy-two shot himself in the porch of Westminster Abbey, 1st February 1797. See Fitzgerald, *King Theodore of Corsica* (1890).

Theodore. See ABYSSINIA.

Theodoret, church historian, was born at Antioch about 390, early entered a monastery, and in 423 became Bishop of Cyrus, a city of Syria. Here he laboured with the utmost zeal, and he himself claims to have converted over a thousand Marcionites. As a foremost representative of the school of Antioch he became deeply involved in the great Nestorian and Eutychian controversies, and was finally deposed by the celebrated Robber-council of Ephesus in 449. This was reversed by the general council of Chalcedon in 451, but Theodoret did not long survive his restoration, dying about 457.

His works were edited by Schulze and Nösselt (Halle, 1769–74), and consist of commentaries on Canticles, the Prophets, Psalms, and the whole of St Paul's Epistles; a *History of the Church*, from 325 to 429 A.D., in five books, ed. by T. Gaisford (1854), trans., with Evagrius (1851); *Religious History*, being the lives of the so-called Fathers of the Desert, a series of most curious and interesting pictures of early ascetic life; the *Eranistes*, a dialogue against Eutychianism; *A Concise History of Heresies*, together with orations and nearly 200 letters. See Binder, *Études sur Théodoret* (Geneva, 1844); Specht, *Theodor von Mopsuestia und Theodoret von Cyrus* (Mun. 1871); Roos, *De Theodoreto Clementis et Eusebii compilatore* (Halle, 1883); and A. Bertram, *Theodoreti Doctrina Christologica* (Hildesheim, 1883).

Theodoric, or THEODERIC (455–526 A.D.), surnamed THE GREAT, was the founder of the Ostrogothic monarchy. The history of his reign is given at GOTHS, Vol. V. p. 322. To the Germans he is known as Dietrich von Bern (Bern being the German name for Verona, one of his principal residences), and is one of the great heroes of old Germanic legend, figuring in the second part of the *Nibelungenlied*. In some of the legends the historical element predominates (his expulsion from Italy and sojourn with Attila and his Huns, &c.); in others he is mixed up with giants, dwarfs, and dragons, so that it seems likely the series comprise, along with tales of the king Theodoric, mythological elements that properly belonged to the god Thor. See Hodgkin, *Theodoric the Goth, the Barbarian Champion of Civilisation* (1891).

Theodosius THE ELDER, a Spaniard by birth and a skilful Roman general, was sent to Britain in 367 A.D. to repel the inroads of the Caledonians and restore order to the diocese. He made London his headquarters, and was so successful in his undertaking that he formed the country between Hadrian's Wall and the Forth and Clyde into a new province of the empire, called *Valentia* in honour of the reigning emperors. After a victorious campaign on the Upper Danube against the Alemanni he quelled a formidable revolt in Africa under Firmus the Moor, and was executed at Carthage in 376 upon some unknown and probably groundless charge.

Theodosius I., THE GREAT, son of Theodosius the Elder, was one of the most notable and most capable of the later Roman emperors. Born about 346 at Cauca in the north-west of Spain, he served under his father in Britain, Germany, and Africa, and won fame as a general by his exploits in Mœsia. Upon his father's death he retired to his native farm, whence he was summoned by Gratian to become his colleague in the purple and emperor in the East (379). It was a critical time. The Goths (q.v.), too numerous and formidable to be attacked *en masse*, flushed too with their recent Cannæ-like victory at Adrianople and the total defeat of his predecessor Valens, were roaming the country at will, unchecked masters of the situation. His military reputation was equal to the strain. He made Thessalonica his headquarters, and within four years, through patience and tact, after reviving the spirits of the imperial

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troops by small but decisive victories, he broke up the vast Gothic army, attached many of its members to the empire as faithful soldiers and allies under their own chiefs, and restored tranquillity to the troubled country south of the Danube. A serious illness in 380 led to his baptism as a Trinitarian, and, as a consequence, to the restoration of the religious unity of the empire and the promulgation of various edicts against Arianism and other heresies. He appointed Gregory Nazianzen Archbishop of Constantinople, and summoned the second general council, which met there (381) to supplement the labours of Nicæa. The murder of Gratian at Lyons, the advance towards Italy of the upstart Maximus, proclaimed emperor in Britain, and the arrival of Valentinian II. (with his mother Justina and his sister Galla) begging for help led to Theodosius' marriage with Galla, to his victory at Aquileia (388), and to the restoration of his youthful colleague. Hereafter for some years Theodosius lived at Milan enjoying the friendship and respect of its bishop, St Ambrose. The relationship of those two great men—foremost respectively in state and church—honourable to both and dramatic in its climax, is one of the most interesting features of Theodosius' reign. Theodosius was able, just, even generous, virtuous, and religious, but inclined to indolence and of a passionate temper. He had cancelled, upon the entreaties of its bishop and the penitence and humiliation of its leading citizens, the severe measures meted out to Antioch after a riot (387) in which the imperial statues had been contemptuously overthrown; but in 390, when the governor of Thessalonica was lynched by a circus mob for his punishment of a brutal but favourite charioteer, Theodosius, in spite of expostulations, ordered the people of the city to be invited into the circus and there massacred. At least 7000 were thus put to death. Thereupon Ambrose wrote to Theodosius upbraiding him with the deed, and even after some time had elapsed fearlessly withstood his attempt to enter the church at Milan. The bishop only readmitted the emperor to the sacrament after eight months' retirement and public penance performed in the face of the whole congregation. In 392 Valentinian II. was murdered, and in 394 Theodosius, then at Constantinople, again marched westwards, this time against the Frankish general Arbogast and his puppet emperor Eugenius. After a stubborn fight at the river Frigidus, lasting two days, Theodosius gained a complete victory, and for four months ruled as sole Roman emperor. He expired in the arms of Ambrose on 17th January 395—a date memorable in the history of the later Roman empire, for almost immediately thereafter followed the barbarian invasions of Greece and Italy, which led directly to the subsequent Teutonic settlements in the south and indirectly to the formation of the kingdoms of modern Europe. For Theodosius II., see BYZANTINE EMPIRE, Vol. II. p. 600.

Theognis, a Dorian noble of Megara, flourished about the middle or in the later half of the 6th century B.C. His lot was cast in a troubled time. The overthrow of the tyrant Theagenes brought oligarchy and democracy face to face, and produced a period of confusion and struggle, during which Theognis was driven from his native city. Before his return he had visited Eubœa and Sicily. Under his name two books of elegiacs have come down to us numbering together about 1400 lines. Most of his political verses are addressed to a young Megarian noble named Cyrnus, on whom he seeks to impress the orthodox doctrines of Dorian aristocracy. The oligarchs are the 'good;' the commons the 'bad.' At dinner Cyrnus must sit as near as possible to a good man, so as to carry off some benefit from what he says. The growing influence of wealth disturbs his vision of the future. 'Money mixes race;' but such marriages are the bane of the city. His conclusion is that 'the best thing for a man is not to be born into the world at all, and the next best thing is to die at once.' His social verses present him in a less melancholy mood. Here too the didactic element plays a large part, though his wisdom is more worldly than moral. It is a disgrace to be drunk when the company are sober, but also a disgrace to be sober when the company are drunk, and the ideal stage is that of being 'no longer sober and yet not very drunk.' Cyrnus must suit his demeanour to his company. 'Amongst the uproarious,' says Theognis, 'I am very uproarious, and amongst the proper no man more proper than I.' Cyrnus must 'exceed in nothing; the mean is best in all things.'

For beauty of thought, expression, or imagery we must look elsewhere than in the elegiacs of Theognis. Passion there is none, nor do the profound problems of life which filled the drama of a later age seem to have touched the poet's simple Dorian mind. But his shrewd common sense recommended him to conservative fathers as an authority for their children's instruction, and his wise sayings were so well known that it became a proverb, 'I knew that before Theognis was born.' See Hookham Frere's *Theognis Restitutus* (Malta, 1842).

Theogony, the name given in ancient Greece to a class of poems recounting the genealogy of the gods. Musæus (q.v.) is said to have written the earliest Theogony; but his work, as well as the Theogonies of Orpheus (q.v.) and others, have perished, that of Hesiod (q.v.) being the only one that has come down to us. The story of Creation (q.v.) is on the other hand called COSMOGONY.

Theology (Gr. *theologia*), a doctrine as to the Divine nature and operation. The word first occurs in Plato and Aristotle, who understand by it the doctrine of the Greek gods, and of their relation to the world. Homer, Hesiod, Orpheus, &c. are called *theologoi* ('theologians') on account of the subject-matter of their verse. In the New Testament the word theology does not occur; the Greek Christians originally designated any deep philosophical apprehension of the truths of religion by the term *Gnosis* ('knowledge'), which was opposed to *Pistis* ('faith'), the simple irreflective trust of the majority of humble believers. First during the 3d and 4th centuries the word theology came into use, especially in connection with such of the Fathers as defended the doctrine of the deity of the Logos; in this sense the evangelist John and Gregory of Nazianzen were termed *Theologians.* Scholasticism understood by theology the whole complex of Christian doctrine—to which in England the name divinity is often given.

Natural theology, as discoverable by the light of reason alone, is distinguished from *Positive* or *Revealed* theology, based on the study of divine revelation. Theology is frequently divided into (1) *Historical* theology, treated in this work at CHURCH HISTORY (including history of Dogma); (2) *Exegetical* and *Biblical* theology (see EXEGESIS, BIBLE); (3) *Apologetical* theology, or the evidences (see APOLOGETICS); (4) *Practical* theology, including homiletics, pastoral theology, liturgics, and theories of church government; (5) Theology proper—that is, *Dogmatic*, systematic, or speculative theology. A further subdivision according to the special subject-matter discriminates between theology in the etymological sense as the doctrine of God the Father from Christology, the doctrine of the person of Christ; Pneumatology, or the

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doctrine of the Spirit; anthropology, or the doctrine of man; soteriology, the doctrine of redemption by incarnation and atonement; ecclesiology, the doctrine of the church; and eschatology, or the doctrine of last things, of rewards and punishments in a future life. Other sections are biblical archæology, biblical psychology, theological or Christian ethics, and symbolics or the doctrine of creeds.

Dogmatic Theology, or Dogmatic, is the systematic exposition of the dogmas in which the faith of the Christian church has found its historical expression. Down to the end of the 17th century it was for the most part associated with Ethics (q.v.), and the two were combined as *sacra doctrina* or *Theology*, but from that time the separation became general, and the name *dogmatica theologia*, first used by the Lutheran Buddæus in 1724, was applied to the theoretical part of Christian doctrine. It is the main part of theology, combining the results of exegetical and historical inquiry which relate to faith as such. Dogmatic takes these results, brings out their organic connection with the facts of Christian consciousness, and gathers them into a coherent whole, which it presents as the sum of Christian truth in the form suited to the church's present need. It is not a product of the religious consciousness of the individual, but is drawn from those historical sources in which the Christian consciousness of the church has expressed itself in a form accepted as authoritative by the church, or a particular section of it. The churches of the Reformation recognised the Scriptures as the only source of knowledge as to the Christian faith. The orthodoxy of the 17th century, which laboured to bind the human spirit to the letter of Scripture by the fetters of a new scholasticism, was largely displaced in the 18th by the development of philosophical and historical science; and in the 19th the reconciliation of religion and science, the deepest Christian faith and the freest human culture, was initiated by Schleiermacher. With his *Glaubenslehre* begins the modern development of dogmatic, which is devoted to the investigation of the Christian faith as founded on religious experience, and to the study of doctrine for its religious and moral interest, apart from the questions of physical and metaphysical science in which the earlier theologians involved them. The division of dogmatic that has been most followed is by that known as the 'local' method, which treated the subject in separate parts, regarded as the articles (*articuli*, 'joints') of a *corpus dogmaticum*. Melanchthon in his chief work on dogmatic (*Loci communes*) adopted this traditional plan, and was also followed by later Protestant writers. In the 17th century Cocceius and Vitsius introduced the 'federal' method, in which the matter was divided according to the covenants (*fœdera*) which God entered into with man, distinguished as the covenant of nature or of works, and the covenant of grace, with its three economies—before the law, under the law, and after the law. The speculative theologians, Marheineke, Martensen, and Strauss, chose a threefold division as drawn out by Hegel, making the doctrine of the Trinity the basis of distribution. The attempt of Schleiermacher (in which he was followed by Rothe) to treat dogmatic simply as a historical science, giving a systematic account of the doctrines recognised as authoritative in a Christian community at a given time, led to new points of view in the division of dogmatic. Thus Rothe arranges the whole subject under two heads, the consciousness of sin, and the consciousness of grace. Of the earlier writers on dogmatic must be also named Calvin, and after him Ames, Turretin, Mastricht, and the Arminian Limborch, and the Lutherans Hütter, Calovius, Calixtus, and Gerhard. Hill's *Lectures on Divinity* (1821) was the first noteworthy treatise on the subject published in English. Chalmers' *Institutes of Theology* is merely a suggestive sketch. Anglican systematic theology is usually in the form of expositions of the Creed or of the Articles. Among notable modern systems of dogmatic must be noted the *Systematic Theology* of the American Calvinistic Presbyterian, Dr Charles Hodge (3 vols. 1872–73). Gretillat's *Exposé de Théologie Systématique* (4 vols. 1885–92) is an important recent work.

Of other modern writers the chief are De Wette, Hase, Twesten, Nitzsch (Eng. trans. Edin. 1849), Lange, Martensen (Eng. trans. Edin. 1866), Schenkel, Scholten, and Dorner; together with Ebrard, Thomasius, Philippi, Kahnis, Hoffmann, Luthardt, Oosterzee, Nitsch, and Achelis, who treat the subject from a more strictly confessional point of view; the speculative theologians Daub, Weisse, and Heinrich Lang; and the Roman Catholics Hermes, Baader, Klee, Staudenmaier, Günther, and Peronne.

See Rothe, *Zur Dogmatik* (2d ed. 1869); Schöberlein, *Das Princip und System der Dogmatik* (1881); Hagenbach's *Encyclopädie und Methodologie der Theologischen Wissenschaften*; Dorner's *Geschichte der Protestantischen Theologie*; Shedd's *History of Christian Doctrine*; and the theological encyclopædia of Herzog (q.v.). For the biblical theology of the Old Testament there are the works of Oehler and Schultz; for the New Testament, Schmid, Weiss, Immer, and Reuss's *Histoire de la Théologie Chrétienne au Siècle Apostolique*.

Many of the theological articles in this work, besides those above mentioned, will be found in the lists appended to CHURCH HISTORY and ROMAN CATHOLIC CHURCH. See also the articles on the several books of the Bible, those on the apostles and great Christian teachers, the paragraphs on the churches of the several countries, and the following:

Adam.	Christianity.	Port-Royal.
Agnosticism.	Clergy.	Prayer-book.
Anabaptists.	Creation.	Predestination.
Antinomians.	Deism.	Rationalism.
Articles.	Ebionites.	Religion.
Asceticism.	Heaven.	Sabbath.
Atheism.	Hell.	Scepticism.
Atonement.	Inspiration.	Spirit, Holy.
Baptism.	Jews.	Spiritualism.
Bible.	Miracle.	Swedenborg.
Catechism.	Pantheism.	Theism.
Christ.	Pelagians.	Theosophy.

Theophany (Gr., 'appearance of God'), specially the appearance of God to the patriarchs in the form of an angel or in human form; also the incarnation and second coming of Christ.

Theophilanthropism, a deistical system of religion drawn up under the French Directory in 1796, and designed to take the place of Christianity, which had been abolished by the Convention. God, virtue, and the immortality of the soul were the main elements of the creed; the services were simple to baldness. The system finally disappeared about 1802.

Theophilus, a legendary coadjutor-bishop at Adana in Cilicia, who, when deposed from his office through slanders, gave his soul in bond to the devil, and consequently was reinstated the next morning. But he was soon overtaken with remorse, and through forty days' fasting and prayers prevailed on the Virgin to make intercession for him. She tore the bond from the devil, and laid it upon the breast of the repentant sinner as he lay asleep in the church. Theophilus then made a public confession of his crime and of the mercy of the Virgin, and died three days after. This forerunner of the Faust legend must have reached the West during the 10th century. It was treated by Roswitha, by Hildebert of Tours, and in a 14th-century Dutch metrical version (published by Blommaert, Ghent, 1836). The first dramatic handling of the subject was in French by

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Rutebeuf (q.v.); then repeatedly during the 14th and 15th centuries in Low-German (*Theophilus, in Icelandic, Low-German, and other Tongues*, by Dasent, Lond. 1845). See A. Ebert, *Allgemeine Geschichte der Literatur des Mittelalters*, iii.

Theophilus, Bishop of Antioch from 168, wrote (180–181) in three books, addressed to a pagan friend Autolycus, an apology for Christianity (ed. by Otto in *Corpus Apologetarum*, vol. viii. Jena, 1861). The genuineness of a commentary on the gospels is defended by Zahn, assailed by Harnack.

Theophrastus, naturalist and philosopher, born at Eresos, in the island of Lesbos, probably 373 or 368 B.C., repaired, after an excellent education, to Athens, where he heard Plato and Aristotle, attaching himself particularly to the latter, whose intimate friend and successor he became. He accompanied his master to Stagira, and inherited, by will, the whole Aristotelian library, the largest then known, including the philosopher's original manuscripts and unpublished writings. As head of the Peripatetic school he displayed an all-round versatility not unworthy of Aristotle himself, and was the reputed author of 227 works. His authority remained for many years paramount in logic, psychology, ethics, politics, rhetoric, physics, and metaphysics, in all of which subjects he preserved the lines of his predecessor, while supplementing most of them wherever they seemed defective. His writings are in great part lost, particularly the valuable zoological series in which he dealt with the instincts and habits of animals; but we still possess his *History of Plants*, his *Causes of Plants*, his treatises on *Stones* and on *Fire*. In his hands ancient botany attained its highest development, and after him it seems to have been cultivated only in its relation to medicine. His *XXX. Characters* is another of his extant works—a masterly delineation of moral types, which, however, some scholars assume to be a later compilation from a more discursive original of his. His death is fixed at 286 B.C., after directing for a whole generation the Peripatetic school, which attracted many disciples from all parts of the Hellenic world. As its permanent seat of instruction he bequeathed to it his house, garden, and colonnades.

For a full and accurate review of his writings as a naturalist, see *Die Pharmacie bei den alten Culturvölkern*, by Dr J. Berendes (vol. i. 1891), and for his position in Ethics the masterly edition of the *Characters*, with introduction and trans. by Professor Jebb (1878). The best editions are those of Schneider and Vimmer. See also Usener's *Collectanea Theophrastea*.

Theophylact, a famous Greek exegete, a native of Euripus in Eubœa, who became Archbishop of Achrida in Bulgaria in 1078, and died after 1107. He wrote commentaries on almost the whole Bible, printed in Venice (3 vols. 1754–58).

Theosophy, literally divine wisdom (*theos, sophia*), is a name that since the time of Ammonius Saccas, in the third century after Christ, has been used in the West to cover various schools of religious philosophy, which all unite in the fundamental conception that man, in his innermost nature, is a spiritual being, one in his essence with the Universal Spirit manifested in and through the universe. In this general sense it has been taken to include mystics differing widely from each other in details; among these are the Simonian, Ophite, and Valentinian schools of so-called Gnosticism; the Neoplatonist of Ammonius Saccas, Porphyry, Plotinus, Iamblichus, and Longinus; the great Hermetic and Rosicrucian orders, which kept an unbroken tradition through mediæval and modern Europe; together with the teachings of men like Jakob Boehme, Henry Vaughan, and Law. These may be taken as representing the Occidental stream of Theosophical thought, which has naturally acquired a Christian tone in its symbolism, whereas the Oriental has utilised the symbolism of the great eastern religions. In the East the system now called Theosophy has been known for ages under the titles of Âtmâ Vidyâ ('spirit science'), Brahmavidyâ ('science of Brahma'), Gupta Vidyâ ('secret science'), and other similar names. All alike, in East and West, draw their inspiration and their methods from the 'Wisdom Religion,' the ancient esoteric philosophy. This claims among its initiates the men who have given to the world fragments of the teaching as basis for world-religions, men like Buddha, Confucius, Zarathustra, Pythagoras, Plato, Jesus, to say nothing of yet more ancient sages, Manu, Nârada, and other great Rishis. In the 16th century Paracelsus and Giordano Bruno are among its grandest exponents, and in our own day its messenger was a woman of Russian birth, Helena Petrovna Blavatsky (1831–91), who was initiated in Tibet, and whose works form the most complete exposition of the esoteric philosophy.

The Esoteric Philosophy, or Wisdom Religion, is a body of teaching, philosophical, scientific, and religious, which is believed to be preserved from generation to generation by a brotherhood of initiates scattered over the world, but preserving close and intimate relations with each other. It is to a group of these now stationed in Tibet that the founding of the Theosophical Society in 1875 is ascribed, and it is these who are constantly referred to in Theosophical literature as Mahâtmas, Arhats, Masters, Brothers, or Adepts. They are living men, who have evolved the spiritual nature until the physical body and brain-consciousness have become ductile instruments for the spiritual intelligence; and who, by virtue of this evolution, are said to have gained a control over natural forces which enables them to bring about results that appear to be miraculous. The possibility of this evolution, and the nature of the powers inherent in the highly evolved man, derive inevitably from the postulates of the esoteric philosophy.

This philosophy teaches as basic principles an eternal existence beyond human cognition, existence *per se*, absoluteness or 'be-ness.' A periodical aspect of this is life, consciousness, manifesting itself in and as the universe, primarily emanating as the dual root-substance, matter on its negative, and spirit, or energy, on its positive side. This duality is the note of the manifested universe, manifestation being held to be impossible without the 'pairs of opposites,' positive—negative, active—passive, light—darkness, &c., ultimating at one part of the chain of evolution in sex-difference, male—female. Spirit and matter are therefore not separable, but are merely the opposed poles of the one root-substance, and are present in every particle, as the poles in each fragment of a broken magnet. Evolution consists in the gradual densifying of the root-substance through seven stages or planes of differentiated existence, the matter aspect becoming more and more prominent as the evolution proceeds, and the spirit aspect becoming more and more hidden; thus matter reaches its fullest differentiation, evolving the whole of its capacities as a vehicle. From this point of completest materiality begins the returning curve, during which matter becomes translucent to spirit, and spirit becomes self-conscious on all planes; having manifested itself as brain-intellect on the most material plane, it recovers all its subtler super-intellectual powers on the ascending arc, but always with the addition of self-consciousness and individuality, until, at the completion of the cycle, matter has become a perfect objective presentment of spirit, a perfect vehicle of spiritual activity.

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The seven stages of cosmical evolution, aspects of the universal Divine consciousness, correspond with seven stages of human evolution, aspects of the human consciousness, by each of which man can cognise directly the corresponding cosmic state. These in man are distinguished as (1) Âtmâ, pure spirit, one with the universal spirit; (2) Buddhi, the vehicle of Âtmâ and inseparable from it, sometimes spoken of as the spiritual soul; (3) Manas, the mind, the ego or individualising principle, sometimes called the rational or human soul. These three are the immortal part of man, Manas striving for union with Buddhi, such union making the spiritual ego, the spiritual man perfected. The remaining principles form the quaternary, the perishable part of man. These are (4) Kâma, the emotions, passions, and appetites; (5) Prâna, the vitality; (6) Linga Sharîra, the astral double; (7) Sthûla Sharîra, the physical body. [These principles are generally numbered in reversed order, starting from the physical, Sthûla Sharîra being taken as 1 and Âtmâ as 7.] At death, it is taught, the physical body and the astral double disintegrate together; the vitality returns to the universal life; the passional nature, in its own ethereal envelope, exists for a longer or shorter period, according as it dominated, or was subservient to, the higher nature, but ultimately fades away. The higher triad has, during earth-life, been joined to the lower nature by Manas, the mind; this Manas is divided into higher and lower, the higher striving upwards, the lower entangled with Kâma, and held by the desire for material life which is at the root of all manifestation. At death the higher triad gradually separates itself from the lower nature, the lower mind, which is but a ray of the higher, returning to its source, carrying with it the experiences gained during incarnation; the triad, with this added experience, the harvest of life, enters on a period of repose, the state of Devachan. A state of consciousness apart from the physical body, in which the intelligence is free from physical limitations, is one but dimly apprehended by those who are accustomed to confine their ideas of life to the physical world, or to a spiritual world which is merely a sublimated reflection of the physical. Devachan is not a place; it is a state of consciousness in which the experiences of the lately concluded earth-life are assimilated, its best aspirations have their fruition, and the communion of the consciousness with other consciousnesses is freed from physical limitations, and is more complete and satisfying. This state endures for a period proportionate to the stage of evolution reached on earth, and is concluded by the re-entry of the consciousness into the embodied condition.

For the method of evolution, according to Theosophy, is Reincarnation. The reincarnating ego, the agent in progress, is the Manas. In the far-off past, when physical evolution, guided by the indwelling spirit, had produced man's physical form, Manas first became incarnate therein, and has since reincarnated after each devachanic interlude. Throughout each incarnation it labours to evolve in the body it inhabits the capacity to respond to its impulses, but it is through the moulding of successive bodies that it accomplishes its task of human elevation. The thoughts produced by its activity are real *things* on the mental plane, made of subtle matter, 'thought-stuff,' a form of ether. The thoughts of each life ultimate in a thought-body, that expresses the result of that incarnation, and this thought-body serves as a mould into which is built the physical body which forms the next dwelling of the ego. The 'innate character' which the child brings into the world is this result of its own past, and is physically expressed in its brain and nervous organisation. The reincarnating ego is drawn by affinity to the nation and family fitted to supply the most suitable physical material and psychical environment. The physical particles thence supplied are stamped with the racial and family characteristics, bodily and mental, but their arrangement is dominated by the thought-body resulting as above stated. Thus mental and moral capacities gained by struggle in one or many incarnations become innate qualities, exercised 'naturally,' without effort, in a later incarnation, and thus progress is secured. This law, by which all causes work out their due effects, is called Karma (the Sanskrit word for action), and according to this all thoughts, good and bad, leave their traces on the thought-body and reappear as tendencies in future lives. No escape from this sequence of cause and effect is possible; all our past *must* work itself out, but as the same agent that made the past is making the present it sets up fresh causes in meeting the effects of the past. Thus a trouble, generated by past action, is inevitable; it is in our Karma. But we may meet it badly, and so set up fresh cause for bad Karma in the future; or we may meet it well, and so generate good Karma. We made our present destiny in our past, and we are making our future destiny in our present.

The teaching of Reincarnation as the method, and Karma as the law, of evolution leads to the doctrine of universal brotherhood, which it is the object of Theosophy to realise. Offspring of the universal life which is the soul of the universe, bound inextricably together by the ties of Karma, evolving to one common goal of perfect humanity, how should men be aught but brothers? Reincarnation crushes out all differences of race, sex, class; Karma so interweaves human lives that each can only find happiness and perfection as all find it. These facts in nature yield, it is claimed by Theosophy, a scientific basis for ethics, and make the practical recognition of human brotherhood a necessary condition of accelerated evolution.

Besides the works of Paracelsus, Bruno, and Boehme the student should consult H. P. Blavatsky's *Secret Doctrine*, *Isis Unveiled*, *Key to Theosophy*, *Voice of the Silence*; the present writer's *Seven Principles of Man*, *Reincarnation*; A. P. Sinnett's *Esoteric Buddhism*; W. Q. Judge's *Echoes of the Orient*; for the Christian aspect, Dr Anna Kingsford's *Perfect Way*, *Woman clothed with the Sun* (Theosophical Publishing Society, 7 Duke Street, Strand, London). There is a very large pamphlet literature. The Theosophical Society has its headquarters at Adyar, Madras, India, where a monthly periodical, *The Theosophist*, is published. European headquarters are at 17 and 19 Avenue Road, London, N.W., and the leading European monthly magazine is *Lucifer*, published at 7 Duke Street as above. American headquarters are at 144 Madison Avenue, New York, and there a third monthly, *The Path*, is published. There are nearly 300 branches of the society scattered over the world.

Therapeutæ (Gr., 'worshippers'), an ascetic sect, mentioned in the *De Vita Contemplativa* long ascribed to Philo as living chiefly on the Lake Mareotis, near Alexandria. Their discipline resembled that of the Essenes, but was more severe in food and in the preference for the solitary life to the common fellowship. Throughout the week each lived in his lonely dwelling (*μοναστήριον*), but on the Sabbath they assembled for worship. The sole authority for their existence, the *De Vita Contemplativa*, is not now attributed to Philo, although indeed Edersheim defended his authorship with vigour and ability. It is rather believed to be the work of an early Christian, written about 300 A.D. —an imaginative idealisation of the life of Christian monasticism and asceticism of the time. See P. E. Lucius, *Die Therapeuten* (Strasburg, 1879).

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Therapeutics (Gr. *therapeuō*, 'I heal') is that division of the science of medicine which treats of the various actions of remedies upon the diseased animal system, or the means by which nature may be aided in her return to health. 'Suggestive Therapeutics' is a term for Hypnotism (q.v.) employed as a sanative agency.

Therapia, a Turkish town of 3000 inhabitants, finely situated on the Bosporus, 15 miles NE. of Constantinople. It is the summer residence of the ambassadors and Frankish merchants.

Theresa, St. See Teresa.

Theresiopel. See Szabadka.

Theriaca (Gr., from *thērion*, 'a wild beast'), a medicine in the form of an electuary, supposed to be an antidote to the poison of venomous animals. It is said to have been invented by Andromachus of Crete, physician to the Emperor Nero; and was a mishmash of about seventy ingredients, some of them quite inert, and others antagonistic to one another. Yet it continued in repute until recent times; in Venice, Holland, France, and elsewhere the druggists had for centuries to prepare the compound with certain solemnities in the presence of the magistrates. The term was applied to various compounds of a similar nature, and *theriac* and *theriacal* became synonymous with medicinal. The English word *treacle* is a corruption of *theriacal*, and originally meant an electuary, or compound syrupy medicine; and it was applied to molasses from the similarity in appearance.

Thermidor, i.e. the 'Hot Month,' formed, in the calendar of the first French Republic, the 11th month, and lasted from the 19th July to the 18th August. The 9th Thermidor of the Republican year 2 (July 27, 1794) is historically memorable as the date of Robespierre's fall, and the termination of the Reign of Terror. The name Thermidorians was given to all those who took part in this fortunate *coup d'état*, but more particularly to those who were desirous of restoring the monarchy.

Thermodynamics is the branch of physical science which discusses the relation between heat and work. It forms the kernel of the modern doctrine of Energy (q.v.); for it was by the discovery that heat was energy and not matter that the conservation principle was established in its widest generality. Towards the end of the 18th century Davy and Rumford had independently shown that the caloric theory of heat was untenable. But it was not till thirty or forty years later that the scientific mind began to emancipate itself from this theory which regarded heat as an imponderable substance effecting thermal changes by combination with ordinary ponderable matter. With the early development of the true theory the names of Colding, Hirn, Joule, and Mayer are closely associated. The labours of Joule (q.v.) were particularly valuable, as he it was who first in 1843 obtained a really good measurement of the mechanical or dynamical equivalent of heat—that is, the amount of dynamical work which is equivalent to a given quantity of heat. This equivalent is commonly called Joule's Equivalent. By demonstrating experimentally that wherever energy in the dynamical form is lost an exact equivalent of heat is always obtained, Joule established what is known as the First Law of Thermodynamics. Briefly put, this law is the statement that heat is energy, and can be measured in the same units. When during any transformation of energy heat is generated, it is at the expense of an exact equivalence of energy in some other form. Or when, on the other hand, there is a disappearance of heat, an exact equivalence of energy in some other form or forms will appear.

It is a familiar fact that relative motion is destroyed by friction. But destruction of motion means loss of kinetic energy; and it is this lost energy which is transformed into the heat invariably produced by friction. There is no difficulty in effecting the transformation of other forms of energy into heat. It is impossible, indeed, to prevent some of the energy taking the form of heat whenever a transformation is effected—whenever, in other words, any change of physical conditions occurs. But whatever be the manner of the transformation, the first law of thermodynamics is found to be always fulfilled, the amount of heat generated is equivalent to the energy, in other forms, which has disappeared. Joule's earliest determination of the dynamical equivalent of heat differed by only $\frac{1}{2}$ per cent. from his latest, made in 1878. This last result has probably not been excelled in accuracy by any later experimenter. According to it the quantity of heat capable of raising the temperature of a pound of water, weighed *in vacuo*, from 60° to 61° Fahrenheit requires for its evolution an expenditure of work represented by the fall of 772·55 pounds through a distance of one foot at the sea-level at the latitude of Greenwich; or the dynamical equivalent of the unit of heat defined as above is 772·55 foot-pounds at Greenwich. The scientific unit of heat is now taken to be the amount of heat required to raise 1 gramme of water from 0° to 1° centigrade. Hence, reducing to the lower temperature and taking account of the change of thermometric scale, we get for the value of Joule's Equivalent 1391·8 foot-grammes or 42422 centimetre-grammes or $4{\cdot}1623 \times 10^7$ ergs. We may assume these numbers to be correct to four significant figures.

To convert work into heat is an easy matter; but not so the reverse operation, to convert heat into work. This, however, is the function of all our heat engines, using the term in its widest sense as including steam-engines, gas-engines, and all machines which do work by combustion of fuel. It has long been recognised that such machines can work only when there is a difference of temperature. It matters not how much heat may be stored up in a body, it is practically impossible to utilise that heat as working energy unless we have a neighbouring body of lower temperature. But when a difference of temperature exists there is a constant passing of heat from the warmer to the colder body, so that the temperatures tend to become equalised. And thus the very nature of heat is such as to make it lose more and more of its availability for being transformed into useful work. Suppose, however, that it was possible to prevent heat from passing by conduction or diffusion from the warmer to the colder body, and that whatever heat was taken from the system during a suitable series of operations was altogether transformed into work, how does this transformability of the heat depend upon the temperatures? This is the question which is answered by the Second Law of Thermodynamics, the development of which is closely associated with the names of Carnot, Rankine, Clausius, and Thomson (Lord Kelvin).

Sadi Carnot (q.v.), in his *Réflections sur la Puissance du Feu* (1824), clearly laid down the lines along which the complete theory must be developed. His own argument was vitiated by the assumption of the then accepted caloric theory of heat. But we know from his posthumous papers published in 1878 that Carnot himself had, before his premature death in 1832, recognised that heat was energy, and had fully enunciated the First Law of Thermodynamics.

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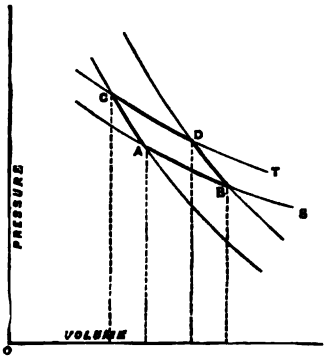
Besides sketching out a series of experiments almost identical with the valuable researches subsequently made by Joule and Kelvin, Carnot made an estimate of the dynamical equivalent of heat, which, though one-sixth too small, was more accurate than Mayer's made in 1842. Carnot is now recognised as one of the greatest scientific men of the century; and had he survived there is no doubt that the theory of heat would have been established nearly thirty years earlier than it was. Carnot's methods, as given in his book, were not appreciated till Kelvin in 1848 drew attention to them. Soon after Clausius, correcting the one flaw in Carnot's reasoning, established the Second Law on its modern basis. To Kelvin we owe the doctrine of the dissipation of energy and the definition of the absolute thermometric scale. By this is meant an energy method of measuring temperature, independent, that is, of the kind of substance used. See TEMPERATURE and THERMOMETER. To make this scale intelligible involves the discussion of Carnot's principle, which is virtually the second law.

The novel feature of Carnot's method was the invention of the cycle of operations, and especially the reversible cycle. An engine or working substance will have passed through a cycle of operations when all its parts have recovered exactly those physical conditions (volume, pressure, temperature, and the like) which they had at the beginning. It is only when such a cycle has been completed that we have any right to reason about the transformations of energy which have taken place during the progress of the operations which constitute the cycle. For simplicity take as working substance a definite quantity of air contained in a chamber, whose volume may be varied indefinitely by the outward or inward motion of a piston. We shall assume that the walls of this chamber can be made either perfectly impervious to heat or perfectly diathermanous. When in this latter condition the substance is to be kept in contact with another substance at the same constant temperature. Volume and pressure changes, which take place in this condition in the working substance, take place *isothermally*, there being no change of temperature. On the other hand, when the impervious condition is realised, whatever changes take place in the working substance take place *adiabatically*, there being no loss or gain of heat. When the temperature of air is kept constant we know by Boyle's law that the pressure varies inversely as the volume. This relation and all similar relations may be represented graphically by means of a curve, every point of which denotes a definite state of pressure and volume. Such a curve is called an *isothermal* line. For any given mass of gas or air there will be a different isothermal line for each different temperature. If we trace a series of isothermals, we can at a glance determine any one of the quantities, temperature, pressure, and volume, when the other two are given. In the figure two isothermals, AB, CD, corresponding to temperatures S and T, are shown. T is supposed to be the higher temperature. Volume is measured horizontally from the origin O, and pressure vertically. The lines CA, DB are supposed to be *adiabatic* lines. They show how volume and pressure vary with one another when heat is allowed neither to leave nor to enter the substance. Just as along each isothermal the temperature is constant, so along each adiabatic there is a quantity called the entropy, which remains constant. Adiabatic lines are also called isentropic. To pass from one isotherm to another we must change the temperature. In like manner, to pass from one adiabatic to another we must change the entropy.



Begin with the working substance in the state A —i.e. with volume Oa, pressure aA, and temperature S. Compress adiabatically till the temperature rises to T and the state C is reached. In this first operation a definite amount of work is done, but no heat is gained or lost. Next, let the substance expand isothermally to any state D, doing work and at the same time taking in heat from the source, which is kept permanently at the temperature T. In the third operation let the substance expand adiabatically until the temperature falls to S and the state B is reached. In this operation a definite amount of work is done by the substance. Finally, compress the substance isothermally until the original state A is reached. Here work is done on the substance, and heat is given out to the refrigerator, which is kept permanently at temperature S. The cycle is now complete. The work done by the working substance or engine is represented by the area ACDB; and this work done must be equivalent to the heat which has disappeared. If Q units of heat are taken in in the second operation (CD), and q units of heat given out in the fourth (BA), Q must be greater than q, and the difference (Q − q) will be dynamically equivalent to the work (W) done by the engine. Now if the engine is reversible in Carnot's sense, it will be possible to go round the cycle in the opposite direction, reversing all the physical processes involved, and generating (Q − q) units of heat by the expenditure of W units of work. Carnot's principle is that this reversibility is the test of a perfect engine. A more efficient engine than the reversible engine cannot exist. To prove this, let N be the reversible engine, and suppose that M is a more efficient engine than N. In other words, M can, with a given supply of heat, do more work than N. The (Q − q) units of heat taken in by M during the cycle will be transformed into (W + w) units of work; and of these W units will be changed back into (Q − q) units of heat by the reversible engine, N, working backwards. Thus in a complete double cycle w units of work will be done, while the heat originally taken from the source at temperature T has been restored to it. To account for this overplus of work we must suppose an equivalent of heat to be taken from the refrigerator at temperature S. Hence if a more efficient engine than the reversible engine existed it would be possible to do work by means of heat taken from the refrigerator. By taking as refrigerator any limited part of the universe, we should be able to cool that part until all heat was removed from it, and so to obtain from it useful work. Such a result is contradicted by all our experience. Hence we conclude that the reversible engine is the perfect engine.

Returning to the cycle of operations, we see that Q units of heat are taken in at the temperature T, and q units given out at the temperature S; and by experience we know that Q and T are greater than q and S respectively. Kelvin's absolute scale of temperature is obtained by defining T and S such that their ratio is the same as Q and q, or

$$q : Q = S : T;$$

this gives $$Q - q : Q = T - S : T.$$

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Now $(Q - q)/Q$ is the ratio of the usefully transformed heat to the whole heat supplied, and is called the efficiency of the engine. Hence the greatest possible efficiency of a heat engine is measured by the ratio of the difference of temperatures of the source and refrigerator to the temperature of the source. This absolute scale is found to be in close accordance with the scale of the air thermometer; and its zero, as determined by Kelvin and Joule, lies 274° centigrade below the freezing-point of water. Thus a perfect engine working between temperatures 0° to 100° C. would have an efficiency of $\frac{100}{374}$, or little more than one-fourth. Practically it will hardly exceed half this value.

Now looking back to the diagram we see that Q is the heat taken in as we pass from the adiabatic CA to the adiabatic DB along the isotherm T, and similarly that q is the heat taken in as we pass between the same adiabatics along the isotherm S. But $Q/T = q/S$, and the same ratio is given by whatever isotherm—i.e. at whatever temperature—we may pass between the adiabatics. We may therefore take this ratio to be the amount by which the entropy increases as we pass from the one adiabatic to the other. The universal tendency of heat is to pass by conduction or radiation from the warmer to the colder body. If, then, H units of heat pass from a body at temperature T to a body at temperature S, the warmer body will lose entropy to the amount H/T, and the colder will gain entropy H/S. S being smaller than T, the gain will be greater than the loss, and hence the entropy of the system will increase by the amount $H(S^{-1} - T^{-1})$. Thus we have Clausius' theorem that the entropy of the universe tends to a maximum. Kelvin's view is slightly different. His doctrine of the dissipation or degradation of energy, otherwise the loss of motivity, will be found discussed under ENERGY. Maxwell has pointed out that if we could deal with the individual molecules of gaseous matter, it would be possible without expenditure of work to raise the temperature of one region and lower that of another, in contradiction to the second law of thermodynamics. Thus it appears that the second law stands on a distinctly different footing from the first law. Its basis is really to be found in the fact that we can deal with molecules of matter only in the aggregate and statistically, and not individually. That it is, nevertheless, essentially involved in many of the processes of nature is shown by the remarkable results which have been obtained by its means. Its consequences have been developed by Rankine, James Thomson, Kelvin, and Clausius, and in later times by Massieu, Gibbs, Helmholtz, and others. Thermo-electricity, radiation, capillarity, the conditions of equilibrium of heterogeneous bodies, the co-existence of different states of the same body, and generally the interrelations of electricity, magnetism, heat, and light, all give interesting illustrations of the second law of thermodynamics.

See Maxwell's *Theory of Heat* and Tait's *Heat* for elementary discussion of the subject, and Tait's *Thermodynamics* for the historical aspect. Bayne's *Thermodynamics* and Parker's *Elementary Thermodynamics* (1891) are the only formal treatises in English. J. J. Thomson's *Applications of Dynamics to Physics and Chemistry* (1888) contains the solution of many complex problems. Clausius' and Kelvin's original papers are still the most important in all thermodynamic literature.

Thermo-electricity. See ELECTRICITY, Vol. IV. p. 275.

Thermometer is a name which, though applicable to any instrument for measuring change of temperature, is usually restricted to such instruments as measure by means of the expansion of substances, and more especially of liquid substances. The ordinary thermometer consists of a glass tube of very narrow bore, which opens out into a bulb at one end. This bulb and part of the capillary tube are filled with the thermometric substance, generally mercury, sometimes alcohol or other liquid, but never water. Mercury is pre-eminently suitable for thermometric purposes. Its freezing-point is lower than the temperatures with which we have usually to deal; and its boiling-point is much higher than that of any other substance which is liquid at ordinary atmospheric temperatures. Throughout a long range it expands very steadily as heat is applied to it. By defining degrees of temperature in terms of equal successive increments of volume of mercury, we get a very serviceable scale, differing but slightly from the scale of degrees as defined thermodynamically by Lord Kelvin (see TEMPERATURE, THERMODYNAMICS). Mercury again is opaque, and does not wet the surface of the glass with which it is in contact. Alcohol and water, on the other hand, are transparent, so that when the former is used as the thermometric substance it has to be coloured. The peculiar behaviour of water near its freezing-point quite condemns its use in thermometry, even if it were suitable in other respects (see HEAT). It would, however, be highly inconvenient otherwise, inasmuch as its freezing and boiling points lie well within the range of easily attainable temperatures. As regards its boiling-point, alcohol has the same disadvantage. It is in the measurement of very low temperatures that alcohol and ether thermometers are particularly valuable. These substances have also the further merit of having a high expansibility.

When the capillary tube and bulb have been constructed, the first operation is to fill in a sufficient quantity of liquid. This is effected by first heating the bulb to expand the air contained in it, and then plunging the open end of the tube into the liquid, which gradually rises through the bore as the air in the bulb cools. The tube is then set with the bulb down and tapped until most of the liquid is shaken out of the tube into the bulb. A second heating of the bulb until the liquid boils still further diminishes the amount of air inside; and more liquid is introduced as in the first operation. The manipulation requires great skill; and the first stage is reached when at ordinary temperatures the required quantity of liquid fills the bulb and part of the tube. The next stage is to seal hermetically the upper end of the tube when it is quite free of air, a condition which is attained by heating the upper surface of the liquid to the boiling-point and so driving out the air. When the sealing is effected the tube and bulb are filled almost entirely with the thermometric substance and its vapour. Probably no thermometer is quite clear of air, for it is difficult, if not impossible, to get rid *absolutely* of the air held in solution in liquids; but the quantity mingled with the liquid or its vapour is excessively minute in the best thermometers.

It now remains to graduate the instrument so that its indications may be capable of interpretation. The most delicate thermometers have an arbitrary scale engraved on the tube before the operation of filling is begun; and afterwards certain definite and known temperatures are measured in terms of it, so that its indications become known. For all ordinary and most scientific purposes it is sufficient to engrave the scale on the stem after the positions of the liquid column have been determined for the two chosen standard temperatures. Thermometers with *attached* scales engraved on ivory or brass are useless for other than the roughest determinations.

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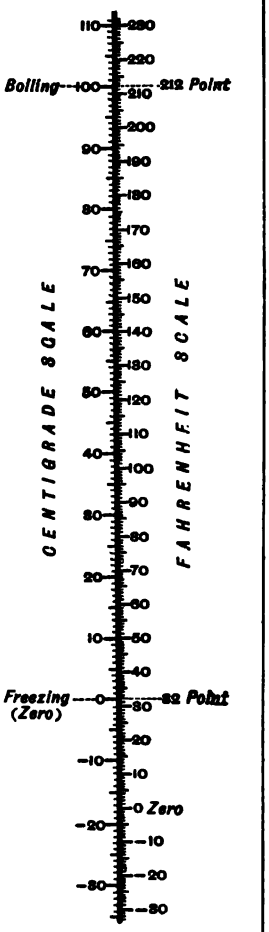
The two standard temperatures universally used in graduating a thermometer are the freezing and boiling points of water. Previous to the discovery that these, under given conditions, correspond to definite temperatures, thermometry could hardly be said to exist. In Newton's scale of temperature (*Philosophical Transactions*, 1701) the freezing-point of water is taken as zero, and the temperature of the human body as 12°. Fahrenheit, who first in 1721 constructed a mercury thermometer, took as his zero the lowest temperature that had then been reached, and called the temperature of the human body 8°. Each degree was subdivided into twelve parts; and subsequently these twelfths were taken as the degrees. This made the temperature of the body 96°; and it was found that the freezing-point of water was 32°. When shortly afterwards it was discovered that the boiling-point of water was always the same under the same barometric pressure, a second and easily determinable standard temperature was obtained. Thenceforward this boiling-point, under a pressure of 30 inches, was fixed at 212° on the Fahrenheit scale, the freezing-point being as before 32°. With these as standard, the temperature of the body is 98°; so that the present Fahrenheit scale is not exactly that which Fahrenheit himself adopted. Celsius in 1742 suggested that the boiling-point be called zero, and the freezing-point 100°. In the modern centigrade scale, commonly called the Celsius scale on the Continent, the freezing-point is taken at zero and the boiling-point under 760 millimetres pressure (29·92 inches) at 100°. Réaumur divided the interval between the freezing and boiling points into eighty divisions, and this scale is still largely used in Russia and Germany.

The centigrade scale is used almost exclusively for scientific purposes. British and American meteorologists, however, prefer the Fahrenheit scale, which has two distinct merits as compared with the centigrade. Its degree is smaller, so that by reading to tenths the observer has a more delicate instrument. To attain the same accuracy with the centigrade the observer must read to half-tenths. Again, the freezing-point being at 32°, it is only under severe wintry conditions that *negative* Fahrenheit temperatures are met with. So inconvenient is the constant occurrence of negative temperatures on the centigrade scale that it is very usual in continental observatories to write −1°, −2°, −3°, &c. in the form 99°, 98°, 97°, making the freezing-point practically 100°, and the boiling-point 200°. For temperatures above the freezing-point the 'hundred' may be omitted without any fear of confusion.

It is often necessary to transform temperature readings from one scale to another, and more especially from centigrade to Fahrenheit, since the latter scale is the more familiar to English readers. The simplest rule is: Double the centigrade number, diminish it by one-tenth of itself, and add 32. The converse rule for changing Fahrenheit into centigrade is: Subtract 32, increase the remainder by one-ninth of itself, and take the half. In the figure the Fahrenheit and centigrade scales are shown side by side. To reduce Réaumur to Fahrenheit, multiply by 2¼ and add 32. To reduce Réaumur to centigrade, increase the number by one-fourth of itself. These rules are simply expressions of the truth that 9 degrees on the Fahrenheit scale, 5 degrees on the centigrade, and 4 degrees on the Réaumur all measure the same temperature interval.

Various modified forms of thermometer are used for particular purposes. Thus the measurement of the humidity of the atmosphere is effected by means of the *wet-bulb* thermometer. In this instrument the bulb is covered with a woollen material kept constantly wet by the capillary action of its hanging ends, which dip into a vessel of water. When the air is saturated with moisture (see DEW) there will be no evaporation from the moist surface covering the bulb, and the wet-bulb thermometer will give the same indication as the ordinary dry-bulb. In a dry and warm air the water surrounding the bulb will evaporate at a rate depending on the dryness and the temperature. This evaporation is accompanied by a cooling of the evaporating substance and the bulb in contact with it, so that the wet-bulb thermometer will indicate a temperature lower than the temperature of the air as shown by the dry-bulb thermometer. The less humid the air is at a given temperature the greater is the difference of readings on the wet- and dry-bulb thermometers.



The Fahrenheit and Centigrade Thermometer Scales.

Maximum and *minimum* thermometers belong to the self-registering class of instrument. The ordinary clinical thermometer for taking the temperature of the body is one form of maximum thermometer. In it a constriction above the bulb prevents the mercury column flowing back *of itself* into the bulb. Thus the upper end of the column continues to indicate the highest temperature reached until it is shaken down by the operator. For meteorological purposes maximum and minimum thermometers are usually laid horizontal or nearly so. In one form of maximum thermometer the mercury pushes a small index in front of it, which remains indicating the highest point reached after the mercury has contracted because of cooling. In the minimum thermometer the index is set in the alcohol which is used as the thermometric substance. As the alcohol contracts it drags with it the index, whose upper end indicates the lowest point reached by the curved capillary surface of the liquid. For measuring the temperatures at different depths of the sea various devices have been used by which the temperature at any required point can be registered, so that it matters not through what temperatures, high or low, the instrument has to pass before it comes into the hands of the observer. The form used so successfully in the *Challenger* expedition will be found described in the first volume of the Physical and Chemical *Reports*.

Instruments for continuous registration of successive temperatures, or for self-registration of temperatures at short intervals of time, form an indispensable part of the equipment of complete meteorological observatories. The photographic

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method is the simplest in which a mercurial thermometer can be employed. Things are so arranged that the sensitive paper, kept steadily moving by clockwork behind the thermometer, can receive only light which has passed through the small bore of the tube above the mercury. When the record has been taken, any point on the line which separates the part of the paper that has been exposed to the light from the part not affected corresponds to the height of the mercury column in the tube at the very instant at which that point on the line lay behind the thermometer. From this record, therefore, any temperature can be picked out at leisure long after the registering of it.

For general convenience and for the certainty of its indications the mercurial thermometer is pre-eminent. Historically older, however, and scientifically superior is the *air* thermometer. As shown in the article Gases (q.v.), the product (pv) of the pressure and volume of a gas is very nearly proportional to the absolute temperature. Hence if we keep the pressure constant, the change of volume will be a direct measure of the change of temperature. The practical difficulty is to keep the pressure constant. It requires indeed a skilful experimenter to manipulate satisfactorily an air thermometer. Such a thermometer is, however, indispensable for measuring the very low temperatures that must be reached before the ordinary gases can be liquefied under great pressure. Leslie's differential thermometer is virtually a U-tube terminated by two balls, whose air contents are separated by spirits of wine filling the bend. In its day it was perhaps the most delicate instrument of its kind; but thermo-electricity (see ELECTRICITY) has now provided us with much more delicate methods of measuring minute changes of temperature.

For the measurement of very high temperatures it is necessary to make use of the expansion of solids. Such an instrument is generally called a Pyrometer (q.v.). By suitable contrivances the very small changes of length for moderate ranges of temperature may be so magnified as to make such a metallic thermometer serviceable for ordinary purposes. Certain forms of self-registering instruments used in meteorology are constructed on this principle. A particularly delicate form of metallic thermometer is Bréguet's. It consists of two thin strips of differently expansible metals soldered together, bent into the form of a helix and fixed at its upper end. A horizontal index is attached to the lower end. When the temperature changes, the one strip expands or contracts more than the other and the helix twists or untwists through an angle nearly proportional to the change.

Thermopylæ (lit., 'the hot gates'), a famous pass leading from Thessaly into Locris, and the only road by which an invading army can penetrate from northern into southern Greece. It lies south of the present course of the river Spercheius, between Mount Œta and what was anciently an impassable morass bordering on the Maliac Gulf. In the pass are several hot springs, from which Thermopylæ probably received the first part of its name. Thermopylæ has won an eternal celebrity as the scene of the heroic death of Leonidas (q.v.) and his 300 Spartans in their attempt to stem the tide of Persian invasion (480 B.C.). Again, in 279 B.C., Brennus, at the head of a Gallic host, succeeded, through the same treachery that had secured a victory to Xerxes, in forcing the united Greeks to withdraw from the pass.

Thersites, son of Agrius, whom Homer, in the *Iliad*, makes the ugliest and most impudent of the Greeks before Troy. His name became a synonym for dastardly impudence. Later poets say he was slain by Achilles for calumniating him.

Thesaurus. See DICTIONARY.

Theseus, the great legendary hero of Attica, son of Ægeus, king of Athens, by Æthra, daughter of Pittheus, king of Troezen, at whose court he was brought up. On reaching manhood he proceeded to Athens, and was recognised by Ægeus as his son and successor. He captured the Marathonian bull, and next delivered Athens from its dreadful tribute of youths and maidens to the Cretan Minotaur, aided by the Cretan princess, Ariadne. When king he consolidated the twelve petty commonwealths of Attica into one state, reorganised the Pan-Athenaic festival, and founded the Isthmian games. He fought the Amazons, and carried off their queen, Antiope or Hippolyta, and after her death married Phædra. Further legends make him take part in the Argonautic expedition, join in the Calydonian hunt, help Peirithous and the Lapithæ against the Centaurs, and join in the attempt to rescue Proserpine from the lower world—an act of monstrous audacity for which he was kept there in close imprisonment till delivered by Hercules. Returning to Athens, he failed to re-establish his authority, and withdrew to Scyros, where he was treacherously destroyed by King Lycomedes; but his shade appeared to aid the Athenians in the fight at Marathon. See ÆGEUS, ARIADNE, MINOTAUR.

Thesiger. See CHELMSFORD.

Thesmophoria. See MYSTERIES.

Thespis, the reputed founder (about 540 B.C.) of Greek dramatic representation. See THEATRE.

Thessalonians, THE EPISTLES TO THE. The first epistle to the Thessalonians, the earliest extant epistle of the apostle Paul, was written at Corinth, probably about the beginning of the year 53 A.D., or, at latest, in 54 A.D., within a year and a half of the founding of the church at Thessalonica under the circumstances related in Acts, xvii. 1–10. Some time after leaving Thessalonica, the apostle had heard of 'sufferings' to which his converts there had been subjected by their unbelieving fellow-countrymen (1 Thess. ii. 14; iii. 2–4), and there was some cause for fear lest 'the tempter' had 'tempted' them from their faith (iii. 5). He accordingly sent Timothy from Athens to learn further about their state, and to 'establish' and 'comfort' them (iii. 2, 5). Timothy brought back to the apostle, now in Corinth, a fairly satisfactory account of their faith and loyalty, but mentioned some matters of Christian doctrine and life in which they were deficient; hence the epistle. Of the two parts of which it is composed the first is mainly personal and explanatory (i.–iii.), and the second ethical and doctrinal (iv. v.), warning in particular against sins of impurity, perhaps also of commercial greed (iv. 6), and still more specially against a tendency of the Thessalonians towards pious idleness in view of Christ's imminent second coming and towards a hopeless sorrow on account of those of their number who had already died. With regard to the second coming, the apostle's own doctrine is that it may be expected at any time, and that diligence and watchfulness are therefore necessary; and he clearly anticipated that at latest it would take place before the generation then living had wholly passed away. Baur, who was the first to deny the genuineness of this epistle, has not been followed in this by the more recent representatives of the Tübingen school.

See the commentaries of Jowett, Ellicott, Lunemann (in Meyer), and Schmiedel (in Holtzmann's *Handcommentar*); P. Schmidt, *Der erste Thessalonicherbrief* (1885); and the New Testament Introductions of Bleek, Hilgenfeld, Reuss, Holtzmann, and Weiss.

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The second epistle consists of three parts. The first part is introductory, and mainly an expression of the writer's thankfulness for the steadfastness the Thessalonians have displayed under continued persecution (i. 1–12). The second part (ii. 1–12) is eschatological, and warns the readers against supposing 'that the day of the Lord is now present' (so R.V.; A.V. has 'at hand'). On the contrary, it will not be except the falling away ('the apostasy') come first, and the man of sin be revealed, the son of perdition, he that opposeth and exalteth himself against all that is called God or that is worshipped; so that he sitteth in the temple of God, setting himself forth as God. This mystery of lawlessness is already at work, only there is one that restraineth. When this restraining presence or influence shall be taken out of the way, then shall be revealed the lawless one, whom the Lord Jesus shall slay with the breath of His mouth, and bring to nought by the manifestation of His coming. The coming of the lawless one is to be according to the working of Satan with all power and signs and lying wonders and with all deceit of unrighteousness. The third and concluding part of the epistle (ii. 13–iii. 18) is of a practical nature, and substantially repeats the exhortations of 1 Thessalonians. The genuineness of this epistle was first doubted by J. E. Ch. Schmidt (1801); the volume of opinion in this sense has steadily increased since then, and is now very great. The argument turns chiefly upon ii. 1–12; in the rest of the epistle there is nothing that can be called un-Pauline, and the question of its absolute genuineness apart from these verses is comparatively unimportant. The difficulty about the eschatological passage in question is, in a word, that no traces of such a view occur in any other writing of the apostle Paul, whether prior or subsequent to the supposed date of 2 Thessalonians. Indeed the difficulty of reconciling it with the ordinary Pauline view is suggested by the passage itself: 'be not quickly shaken . . . by epistle as from us, as that the day of the Lord is close at hand' (*enestēke*); but this is practically the suggestion of 1 Thessalonians. It is impossible to fix with any accuracy the date of the verses in question. They are conceived in the spirit of a great deal of the apocalyptic that was current in Jewish (and in a less degree in Christian) circles during the last two centuries of Judaism; and, with certain modifications, the ideas admitted of application to a considerable variety of circumstances, now to those of the Jews under Caligula, now to those of the Jews or Christians under Nero. On the hypothesis of its genuineness, in whole or in part, 2 Thessalonians must have been written shortly after 1 Thessalonians and before the apostle's sojourn of eighteen months in Corinth had come to an end. Apart indeed from ii. 1–12, 2 Thessalonians may conceivably have been written before 1 Thessalonians, a view which has been argued for by Grotius amongst others.

The literature of the subject is the same as for 1 Thess. Add Weizsacker, *Apost. Zeitalter;* Pfleiderer, *Urchristenthum;* and the suggestive incidental discussion in Spitta, *Offenbarung des Johannes* (1889).

Thessaloni'ca. See SALONICA.

Thessaly, the largest division of ancient Greece, lay south of Macedonia and east of Epirus, being separated from the latter by Mount Pindus, and from the former by the Cambunian Mountains, and the Maliac Gulf and Mount Œta bounding it on the S. It is a vast plain shut in on every side by mountains; on the N. and W. by those already named, on the S. by Mount Othrys, and on the E. by Mounts Pelion and Ossa, the only opening being the Vale of Tempe in the north-east, between Ossa and Olympus. This plain is drained chiefly by the river Peneus (now *Salambria*) and its tributaries, and is the most fertile in all Greece. Thessaly was originally inhabited by so-called Pelasgians, who, however, were either expelled or reduced to slavery by Dorian immigrants from the more rugged region of Epirus about 1000 B.C. (see GREECE, Vol. V. p. 386). The Penestæ, descendants of the old inhabitants, held a position analogous to that of the Helots (q.v.) in Sparta. There were four districts—Hestiæotis, Pelasgiotis, Thessaliotis, and Phthiotis; Magnesia on the coast being a minor division. The government appears to have been oligarchical in the separate cities—of which Pharsalus, Larissa, Heracleum, and Pheræ were the chief—the principal power being in the hands of the two great families of the Aleuads and Scopads. About 374 B.C. Jason, tyrant of Pheræ, was elected Tagus (chief-magistrate) of all Thessaly. The rule of Jason's successors became so unbearable that aid was sought from Philip of Macedon, who in 344 subjected the country to Macedonia. Thessaly remained subject to the Macedonian kings till the victory of Cynoscephalæ, in 197 B.C., brought it under the protection of Rome. Under the emperors Thessaly was united with Macedonia, but after Constantine it was a separate province. In 1204 A.D., with other portions of the eastern empire, it came under the dominion of the Venetians, and in 1355 was taken by the Turks. The restoration to Greece of Thessaly south of the Salambria was recommended by the Berlin Congress in 1878; and subsequently various modifications of the Greco-Turkish frontiers were proposed, the Greeks endeavouring to secure the cession of the whole of Thessaly. War between Greece and Turkey seemed imminent; but in 1881 Turkey agreed to cede, and Greece to accept, Thessaly south of the ridge of mountains forming the watershed of the Salambria (the ancient Peneus), by much the largest and most fertile section of the province. The Greek portion constitutes the three nomarchies of Larissa, Trikhala, and Phthiotis with Phocis.

Thetford, a market-town on the border of Norfolk and Suffolk, at the Thet's confluence with the Little Ouse, 31 miles SW. of Norwich and 12 N. of Bury St Edmunds. Doubtfully identified with the Roman Sitomagus, it was the capital of Saxon East Anglia, the seat from 1070 of a bishopric, transferred to Norwich in 1094; suffered much from the Danes between 870 and 1010; and in Edward III.'s time had eight monasteries and twenty churches (now only three). The steep Castle Hill, 100 feet high and 260 yards in circumference, is one of the largest earthworks in the kingdom; and there are considerable remains of Bigod's Cluniac priory (1104). The grammar-school (1566) was rebuilt in 1879. The industries include brewing, tanning, and the manufacture of farming machinery; and there is some trade by barges on the Ouse. 'Honest' Tom Martin, the antiquary, and Tom Paine were natives. Incorporated in 1573, Thetford returned two members till 1867–68. Pop. (1851) 4075; (1891) 4247. See works by Martin (1779) and A. L. Hunt (1870).

Thetis, daughter of Nereus and Doris, was married against her will by the gods to Peleus, and became the mother of Achilles. She dwelt in the depths of the sea with her father, and had, like Proteus, the power of changing her shape.

Theuriet, ANDRÉ, French poet and romancer, was born in 1833 at Marly le Roi, near Paris, studied law in Paris, and received in 1857 a place in the office of the minister of finance. That same year he published a striking poem in the *Revue des Deux Mondes*, which was followed only in 1867 by *Le Chemin des Bois*, a volume of poems full of the charm of woodland. Later poems were the

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so-called epic *Les Paysans de l'Argonne, 1792* (1871), and *Le Bleu et le Noir* (1872), styled a poem of real life. But Theuriet is best known by his novels, which are ever touched with melancholy and sometimes recall in their feeling for the poetic sides of nature the subtler touch of George Sand. They include *Mademoiselle Guignon* (1874), *Le Mariage de Gérard*, *Une Ondine* (1875), *La Fortune d'Angèle* (1876), *Raymonde* (1877), *Le Filleul d'un Marquis* (1878), *Le Fils Maugars* (1879), *Le Sang des Finoel* (1879), *Tante Aurélie* (1884), *L'Amoureux de la Préfète* (1888), *Deux Sœurs* (1889), and *Nos Enfants—Jeunes et vieilles Barbes* (1892). See the study by Besson (1890).

Thibaut, ANTON FREDRICH JUSTUS (1772–1840), a distinguished professor of Roman Law at the universities of Kiel, Jena, and Heidelberg successively. His chief work is his *System des Pandektenrechts* (1803; 9th ed. 1846).

Thibet. See TIBET.

Thick-knee (*Oedicnemus*), a genus of birds of the family Otididæ. In haunts and habits they closely resemble the Bustards (q.v.), but they differ from them chiefly in having the bill longer, the wings more pointed, and the tarsus finely reticulated before and behind. They are partly nocturnal; their flight is strong and rapid, but somewhat laboured; their call-notes are loud and discordant. Thick-knees run with great speed. They are generally very shy, and are found chiefly in desert places. There are eleven species, widely distributed, being absent only from North America. Only one species is European. It occurs in Britain, and is known as the Common Thick-knee (*O. crepitans* or *scolopax*), and also as the Thick-kneed Plover, Thick-kneed Bustard, Great Plover, Norfolk Plover, and Stone Curlew. It is found in many parts of England on chalk downs and open heaths. A few specimens have been found in Ireland, and it has been recorded from Scotland. Worms, slugs, insects, frogs, and field-mice constitute its food. They build no nest, but choose a depression in the ground in which to lay their eggs, generally two in number. One species is Australian.

Thielt, a town of Belgium, 18 miles SE. of Bruges by rail, with manufactures of lace, linens, and oil. Pop. 9850.

Thierry, JACQUES NICOLAS AUGUSTIN, French historian, born at Blois, 10th May 1795. His father, who became town-librarian, was his first instructor; while yet young he obtained a 'bourse' at the college of his native town, and in 1811 entered the *École Normale*. In 1814 he completed his courses and joined the ranks of the Parisian Liberals. Soon after appeared his first book, entitled *De la Réorganisation de la Société Européenne*. In this and subsequent treatises he considered the notion of one government for the whole of Europe without the destruction of national characteristics. These works were inspired by Saint-Simon (q.v.), whose secretary Thierry became, and with whom he lived for three years. In 1817, however, he and Saint-Simon no longer agreed; and Thierry joined Comte, who had not then fallen under the influence of Saint-Simon (see COMTE). Jointly with Dunoyer Thierry aided for three years in the *Censeur Européen*, where he found plenty of practice as a student and exponent of history. In 1820, however, he contributed his 'Letters on the History of France' to the *Courrier Français*, and showed a new influence acting on his own mind, and destined in turn to act largely on his future readers; bringing history, in fact, to practical application. Thierry dwelt on the principle of race, and attributed the establishment of the feudal system (with the evils which he ascribed to it) to the subjugation of western Europe by the Germans and Scandinavians. In 1825 he published his masterpiece, the *Conquest of England*, followed in 1827 by a series of 'Letters on History;' but the labour cost him his eyesight. In 1828 he went to the south of France for the benefit of his health; and here he met Julie de Quérengal, a lady of considerable literary accomplishment, whom he married. In 1835 he became librarian at the Palais Royal, and published his *Dix Ans d'Études*, the introduction to which is famed for its eloquence. In 1840 he received the 'Gobert' prize, which the Academy made perpetual in his favour. His last work was on the *Tiers État*, published in 1853; and three years later his laborious life was closed by paralysis, 22d May 1856. He may be called the father of romantic history, and a disciple of the school of Sir Walter Scott, whom he regarded as the 'great master of historical divination;' he also described himself as indebted for inspiration to Chateaubriand's *Martyrs*. After Michelet he is the greatest artist of his class. See a monograph by Aubineau (2d ed. 1879).—A younger brother, AMÉDÉE SIMON DOMINIQUE THIERRY (1797–1873), was likewise a Liberal and a historian, his chief works histories of Gaul and of Attila.

Thiers, a manufacturing town in the French dept. of Puy-de-Dôme, on the right bank of the Durole, 23 miles ENE. of Clermont by rail. Its manufactures of cutlery, paper, and playing-cards gave to the town a certain importance in the 17th century. Pop. (1891) 11,993.

Thiers, LOUIS ADOLPHE, French historian, politician, and patriot, was born at Marseilles on April 16, 1797. His father, who seems to have belonged to a family in decayed circumstances, was a locksmith. Through the influence of his mother, who was a Chénier, he received a good education, first at the Lycée in his native city, and subsequently (1815) at Aix, whither he was sent to study law. At Aix he made the acquaintance of Mignet, cultivated literature rather than the law, and won a prize for a dissertation on Vauvenargues. Called to the bar at the age of twenty-three, he set off for Paris in the company of Mignet. His prospects did not seem brilliant, and his almost ludicrously squat figure and plain face were not recommendations to Parisian society. His industry and belief in himself were, however, unbounded, and an introduction to Lafitte, of the *Constitutionnel*, then the leading organ of the French Liberals, gave him the chance of showing his capacity as a public writer. His articles in the *Constitutionnel*, chiefly on political and literary subjects, gained him the entry into the most influential *salons* of the opposition. At this time he made the acquaintance of Talleyrand, Casimir Périer, the Comte de Flahault, and Baron Louis the financier. Meanwhile he was rapidly—indeed too rapidly—preparing his *Histoire de la Révolution Française*. The first two volumes—there were ten in all—appeared in 1823. This work, although it has been demonstrated to be very untrustworthy and inaccurate, more especially in its estimates of persons, gave its author a prominent place among French politicians and men of letters. About this time, too, the gift by his admirer, Cotta, the German publisher, of a share in the *Constitutionnel* raised him to comparative affluence. In January 1830 he, along with Armand Carrel, Mignet, and other friends, started the *National*, and in its columns waged relentless war on the Polignac administration. The ministry met the opposition it had provoked by the Ordonnances of July. Among the other repressive measures that were taken was the sending of a commissary of police to the office of the *National* interdicting its publication. Its

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conductors, with Thiers at their head, defied the ministry, and the result was the revolution which drove Charles X. into exile.

Thiers now entered on an active career as a politician. He was elected deputy for the town of Aix, and was appointed Secretary-general to the minister of Finance. His first appearance in the Chamber of Deputies gave no promise of his subsequent distinction. His diminutive person, his small face, encumbered with a pair of huge spectacles, and his whole exterior presenting something of the ludicrous, the new deputy, full of the impassioned eloquence of the revolutionary orators, attempted to impart the thrilling emotions affected by Mirabeau. The attempt provoked derision; but soon subsiding into the oratory natural to him —simple, easy, rapid, anecdotic—he became one of the most formidable of parliamentary speakers. Almost from the moment of his entrance into public life he and Guizot stood forth in opposition to each other as the champions of Radicalism and Conservatism respectively. But he was a staunch Monarchist, and for a time a favourite with Louis-Philippe. In 1832 he accepted the post of minister of the Interior under Soult, exchanging it subsequently for the ministry of Commerce and Public Affairs, and that in turn for the Foreign Office. He was universally regarded as a stronger man than any of his chiefs during this period; but his public and private actions alike were always marked by a certain fussy quarrelsomeness which prevented him from being ever accounted a statesman of the first rank. The 'spirited foreign policy,' calculated above all things to precipitate a quarrel between France and Great Britain, of which for many years he was the chief advocate, is now allowed to have been a great, and might have been a fatal, mistake. In 1836 he became President of the Council, but in August of the same year he resigned office and became the leader of the opposition. In 1840 he was again summoned to office as President of the Council and Foreign Minister. In a few months he was a terror to the peace of Europe. He refused Lord Palmerston's invitation to enter into an alliance with Britain, Austria, and Prussia, for the preservation of the integrity of the Ottoman Empire, from a sympathy with the principles which dictated the first Napoleon's invasion of Egypt and Syria, and a desire to accomplish by diplomacy with Mehemet Ali what Bonaparte had endeavoured to effect by force of arms—the supremacy of France in these regions. He talked menacingly of setting aside the treaties of 1815 and of extending the French frontier to the Rhine, and is said to have actually spent £8,000,000 on military and naval demonstrations. Then followed the seizure of the Society Islands, and a well-founded protest by the British government against the ill-treatment by the French of Mr Pritchard, their consul at Tahiti. In consequence of this Thiers was forced to resign office, and retire into private life. He now returned to the study of French history. The first volume of his *Histoire du Consulat et de l'Empire* appeared in 1845; it was not completed till 1860. This, the most ambitious of all Thiers's literary enterprises, must be considered a large rather than a great work. It is a monument to its author's industry in reading, and rises here and there to rhetorical brilliance. But that it is inaccurate and unfair has been admitted even by French critics. Thiers greatly overrated Napoleon, and probably to his own hurt.

Thiers was not one of the promoters of the revolution which in 1848 drove Louis-Philippe from the throne. On the contrary, he would, as prime-minister summoned at the eleventh hour, have prevented it if he could. He accepted its consequences in the form of the Republic. He voted for the election of Prince Louis Napoleon as its president. This action brought him much vituperation and ridicule from former political friends. But whatever may have been the motive that inspired it, it certainly did not help him at the time of the *coup d'état* of 1851; he was arrested, imprisoned in Mazas, and banished. Next year, however, he was allowed to return from Switzerland to France. For eight years he was occupied with his *History of the Consulate and Empire*. He re-entered the Chamber in 1863, having been elected Liberal deputy for the department of the Seine in opposition to the Imperialist candidate. Till the fall of the Second Empire he was regarded as the ablest and most formidable of its more moderate and parliamentary opponents. His speeches in the years between 1863 and 1870 were filled with taunts of the Empire on account of the loss of prestige which had marked its history; and these must not be left out of account when blame has to be apportioned among the authors of the war of 1870, although he opposed it when declared by the Ollivier ministry, and predicted defeat.

The collapse of the Second Empire, however, enabled Thiers to play the greatest of all his parts, that of 'liberator of the territory.' He declined, after Sedan, to become a member of the Government of National Defence; but he voluntarily undertook diplomatic journeys to Great Britain, Russia, Austria, and Italy, on behalf of France—a self-imposed mission in which he was unsuccessful, but by which he obtained the gratitude of his countrymen. He was largely instrumental in securing for his country that armistice which permitted the holding of a national assembly with a view to the negotiation of a peace. Twenty constituencies chose him as their deputy. Electing to sit for Paris, he was made head of the provisional government. He had great difficulty in persuading his colleagues of the Assembly, and his countrymen generally, to agree to peace on terms that were practically dictated by Germany. But he succeeded; peace was voted March 1, 1871. No sooner had he accomplished this task than he was face to face with the sanguinary madness of the Commune. But this difficulty also he set himself to surmount with characteristic energy, and succeeded. When the seat of government was once more removed from Versailles to Paris, Thiers was formally elected (August 30) president of the French Republic. He held office only till 1873, but during this brief period he was probably of greater service to his country than at any previous time in his life. He was mainly instrumental in securing the withdrawal of the Germans from France, and the payment of the war indemnity, and in placing both the army and the civil service on a more satisfactory footing. But in course of time the gratitude of the country exhausted itself, and Thiers, who was old-fashioned in many of his opinions, and as opinionative as he was old-fashioned, did not make any new friends. He was specially detested by the Extreme Left, whose chief, Gambetta, he styled a *fou furieux*. As a result, a coalition of Reactionaries and Radicals was formed expressly, as it seemed, to harass him, and even in the beginning of 1872 he tendered his resignation. It was not accepted; and his opponents for a time suspended their intrigues. They were revived, however, in 1873, and resolved themselves into a resolute effort to limit the powers of the president. This Thiers stoutly resisted. He made an appeal to the country, but this course did not increase the strength of his following. Finally what he interpreted as a vote of no confidence was carried (May 24) by a majority of sixteen. He

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resigned, and his place was taken by Marshal MacMahon. He lived four years longer, and never ceased to take an interest in politics. In 1877 he took an active part in bringing about the fall of the ministry presided over by the Duc de Broglie. He now leaned to the side of the Left, and was reconciled to Gambetta, and he might once again have played a prominent part in politics had he not died of apoplexy on September 3, 1877, at St Germain-en-Laye. He has not left behind him the memory either of a very great statesman or of a very great historian. But he was a man of indomitable courage, and his patriotism, if narrow and marred with Chauvinism, was deep and genuine. He was perhaps the most successful of the large class of journalist-politicians that France has produced, and that he was at least a personal power in literature was evidenced by the great influence which he wielded in the Academy, of which he became a member in 1834.

An authoritative biography of Thiers has yet to be published. Many editions of his chief works have been issued, his parliamentary speeches fill a score of volumes, and the studies of him are innumerable. Those of M. Jules Simon and M. Charles de Mazade especially deserve attention, and M. Paul de Remusat's *A. Thiers*, translated (1892) by Melville B. Anderson, discusses its subject carefully from the literary point of view.

Thionville (Ger. *Diedenhofen*), a fortified town of Lorraine, 18 miles N. of Metz by rail, an important railway centre; pop. (including garrison) 7155. Taken by Condé in 1643, it fell with Lorraine to France, but was besieged, bombarded, and taken by the Germans, 9th–25th November 1870.

Third, in Music. See INTERVAL.

Thirlage, an old Servitude (q.v.), or rather service, enjoyed by the proprietor of a mill over the neighbouring lands 'thirled' to it, whereby the possessors (and tenants) of the lands were bound to have their grain ground at that mill, and to pay as 'multure' or duty a certain proportion of the grain ground, varying from a thirtieth to a twelfth of the corn ground. The possessors of the astricted lands were called *sucken*ers; the multure paid by those who were not bound, but used the mill, was out-sucken multure. Since 1799 this class of local burdens has almost entirely disappeared by commutation, voluntary renunciation, or private agreement. Such a servitude or easement was rare in England.

Thirlmere, a narrow sheet of water in the heart of the Lake District (q.v.), lying 533 feet above sea-level, and 3 miles long by ¼ mile wide, between Derwentwater and Grasmere. It was acquired as a water-supply by Manchester (q.v.), and the work of cutting tunnels was begun in 1885.

Thirlwall, CONNOP, a great English bishop and historian of Greece, was born, of good Northumbrian stock, at Stepney in Middlesex, January 11, 1797. He was a child of almost unexampled precocity, learned Latin at three, read Greek at four, and at eleven published *Primitiæ* (1809), a volume of poems and sermons which in later years he did his best to suppress. He next went to Charterhouse, where Grote, Julius Hare, and Henry Havelock were among his schoolfellows; entered Trinity College, Cambridge, in October 1814, and in the February of the following year carried off the Craven scholarship, which only Porson and Professor Kennedy have done as freshmen. That same year he gained the Bell scholarship; in 1818 he graduated as 22d senior optime—there being yet no classical tripos—but his real rank was better marked by the first Chancellor's classical medal. In October he was elected to a Trinity fellowship, and next spent about a year on the Continent, making fast friendship with Bunsen at Rome. He entered as a law-student at Lincoln's Inn in February 1820, and soon after joined the famous debating society that included Mill, Macaulay, Charles Austin, Romilly, the two Bulwers, Samuel Wilberforce, and later Maurice and John Sterling. He was called to the bar in 1825, but the natural bent of his mind prevailed, and in 1827 he took orders.

Already in 1825 he had translated Schleiermacher's *Essay on St Luke* and written an introduction—a remarkable performance for a barrister. His return to Cambridge was marked by the commencement, in conjunction with his dear friend Julius Hare, of a translation of Niebuhr's *History of Rome* (vol. i. 1828; ii. 1832). Their famous *Philological Museum* (1831–33) saw only six numbers, but contained some remarkable papers, among them Thirlwall's 'On the Irony of Sophocles.' Besides all this he took a full share of college and clerical work—the latter at Over, 8 miles from Cambridge. In 1834 he signed the petition in favour of the admission of dissenters to academical degrees, and in May put forth a weighty pamphlet in defence of the measure. Thirlwall pointed out with characteristic plainness the perfunctory nature of the religious education that existed, and expressed the belief that compulsory chapel services were 'a hindrance and not a help to the religious life.' The Master of the College, Dr Chr. Wordsworth, now called on him to resign the assistant-tutorship, which he did at once, though under protest. Almost immediately he was presented by Lord Brougham to the quiet Yorkshire living of Kirby-Underdale. Here he wrote for *Lardner's Cyclopædia* his *History of Greece* (8 vols. 1835–47; improved ed. 1847–52). In 1840 Lord Melbourne raised Thirlwall to the see of St David's, and within six months thereafter he preached in perfect Welsh. For thirty-four years he laboured with the utmost diligence in his diocese, building churches, parsonages, and schools, and augmenting poor livings (to the extent of £30,000 from his own pocket); and, though he wrote no great work, his eleven Charges remain an enduring monument of breadth of view and soundness of judgment in reference to all ecclesiastical controversies of one generation. His Primary Charge (1840) was a catholic-spirited apology for the Tractarian party then being vehemently *charged* against by almost every bishop and archdeacon in England. In later days (Charges of 1866 and 1872) he modified greatly his approval of the spirit that animated the new party, but his grave warnings and protests against their Romanising tendencies rise characteristically into a serenely judicial region far above the heated and vulgar atmosphere of polemical debate. Thirlwall joined in the encyclical letter censuring *Essays and Reviews*, but was one of the four bishops who refused to inhibit Bishop Colenso. He supported the Maynooth grant, the admission of Jews to parliament, and alone amongst the bishops voted for the disestablishment of the Irish Church, although he would have preferred to see a measure of concurrent endowment. He was appointed chairman of the Old Testament Revision Committee, and resigned his see in May 1874, retiring to Bath, where he died, July 27, 1875.

Thirlwall's massive understanding, vast learning, and fundamental breadth and fairness of mind were a combination of enormous value to the Church of England; and no words of epitaph could have been found better than those inscribed on the granite slab over his grave in Westminster Abbey, where he sleeps side by side with his brother-historian Grote: 'Cor sapiens et intelligens ad discernendum judicium.' He never married, but lived throughout life in the midst of his nephews

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and their children, and his love for cats rivalled Southey's. And few men have left a more pleasing though unconscious monument of noble character than the beautiful series of letters to a young lady —the *Letters to a Friend*, edited by Dean Stanley in 1881.

His *Remains, Literary and Theological*, fill three volumes (vols. i. and ii. Charges, 1877; vol. iii. Essays, Speeches, Sermons, 1878), edited by Dean (Bishop) Perowne. The *Letters, Literary and Theological*, were edited by Dean Perowne and the Rev. Lewis Stokes in 1881. See the *Edinburgh Review* for April 1876.

Thirsk, a town in the North Riding of Yorkshire, in the Vale of Mowbray, on the Cod Beck, an affluent of the Swale, 23 miles NNW. of York. It has a fine Perpendicular church, and carries on manufactures of agricultural implements and saddlery. Thirsk returned two members to parliament till 1832, and then one till 1885. Pop. 3164. See W. Grainge, *The Vale of Mowbray* (1859).

Thirst is a well-known sensation, resulting from a peculiar state of the system, but especially of the mucous membrane of the fauces, usually caused by an insufficient supply of liquid. In cases of extreme thirst there is a peculiar sense of clamminess in the mouth and pharynx, which, with the other disagreeable feelings, is almost immediately relieved by the introduction of liquid into the stomach, where it is absorbed by the veins. That the thirst is relieved by the absorption of the fluid, and not by its action as it passes over the mucous membrane, which seems to suffer most, is proved by the facts (1) that injection of liquids into the stomach through a tube (in cases of wounded œsophagus), and (2) the injection of thin fluids, as water, into the blood, remove the sensation of thirst. An excessive thirst is often an important morbid symptom. It may arise from two very opposite conditions—one a condition of excitement, and the other of depression. Whenever the blood is in a state requiring dilution, and is too stimulating, as in fevers and inflammations, there is thirst; and, again, in cases of excessive secretion and exhaustion, as for example in cholera and in the two forms of diabetes, there is great thirst, which sometimes also attends the lowest stages of prostration in malignant diseases. When there is a great loss of the watery portion of the blood by profuse perspiration, caused not by disease, but by hard bodily exercise in a hot atmosphere, as in the case of coal-whippers, mowers and reapers, &c., there is always great thirst, and from two to four gallons of beer or cider a day may, in these cases, be taken with apparent impunity. Cold tea, without milk or sugar, is the most satisfying drink under these circumstances. Independently of disease, great thirst may be induced by the use of salted meat or fish, highly-peppered curries, and other stimulating dishes, the ingestion of malt liquors drugged with salt and more pernicious matters, or of gin strengthened with sulphuric acid, &c.

Thirty-nine Articles. See ARTICLES.

Thirty Years' War, a war or rather an uninterrupted succession of wars (1618–48) in Germany, in which Austria, most of the Catholic princes of Germany, and Spain were engaged on the one side throughout, but against different antagonists. This long-continued strife had its origin in the quarrels between the Catholics and Protestants of Germany, and few wars in modern times have caused more slaughter, misery, ruin, and demoralisation. The severe measures taken by the emperor, the head of the Catholic party, against the Protestants' religion led also to restrictions on their civil rights; and it was to protect their political as well as their religious liberties that the Protestants formed a union in 1608. The rival union of the Catholic powers followed in 1609. (1) *Bohemian War* (1618–20). The withdrawal of concessions to the Protestants of Bohemia by the Emperor Rudolf II. led to an insurrection in Prague and the election of Frederick V., the Elector Palatine, as king of Bohemia (1619); and Count Thurn repeatedly routed the imperial troops. But on 8th November 1620 a well-appointed army of 30,000, under Duke Maximilian of Bavaria, totally routed Frederick's motley array at Weissenberg near Prague, while an army of Spaniards under Spinola ravaged the Lower Palatinate. The Bohemians were now subjected to the most frightful tyranny and persecution.

(2) *War of the Palatinate* (1621–24). But the indomitable pertinacity and excellent leadership of Count Mansfeld and Christian of Brunswick, two famous partisan leaders, who ravaged the territories of the Catholic league, did much to equalise the success of the antagonistic parties. Here the war might have ended; but the fearful tyranny of Ferdinand over all the Protestants in his dominions (Hungary excepted) drove them to despair, and the war advanced to its third phase.

(3) *Danish-Saxon War* (1624–30). Christian IV. of Denmark, smarting under some injuries inflicted on him by the emperor, and aided by a British subsidy, came to the aid of his German co-religionists in 1624, and, being joined by Mansfeld and Christian of Brunswick, advanced into Lower Saxony. But when, by the aid of Wallenstein, a powerful army had been obtained, and the leaguers under Tilly, in co-operation with it, had marched northwards, the rout of the Danes by Tilly at Lutter, and of Mansfeld by Wallenstein at Dessau, again prostrated the Protestants' hopes in the dust; yet a gleam of comfort was obtained from the victorious raid of Mansfeld through Silesia, Moravia, and Hungary. The combined imperialists and leaguers meantime had overrun North Germany and continental Denmark, and ultimately compelled King Christian to conclude the humiliating peace of Lübeck.

(4) *Swedish-German War* (1630–36). Ferdinand, not content with a still more rigorous treatment of the Protestants, and the promulgation of the *Restitution Edict*, which seriously offended even the Catholics, stirred up Poland against Sweden, and insulted Gustavus Adolphus; and the war entered its fourth stage on the landing of the Swedes at Usedom (June 1630), and their conquest of Pomerania and Mecklenburg. Gustavus induced the Elector of Brandenburg to aid him; and though unable to save Magdeburg, he marched to join the Saxons, completely routed Tilly at Breitenfeld (1631), victoriously traversed the Main and Rhine valleys, again routed Tilly on the Lech (1632), and entered Munich. By the judicious strategy of Wallenstein he was however compelled to retire on Saxony, where he gained the great victory of Lützen (1632); but his death there, depriving the Protestants of the only man who could force the confederate powers to preserve unity of action, was a severe blow to their cause; though the genius and indefatigable zeal of his chancellor, Oxenstierna, and the brilliant talents of the Swedish generals, preserved the advantages they had gained, till the crushing defeat of Bernard of Weimar at Nordlingen (1634) again restored to the emperor a preponderating influence in Germany. Saxony now made peace at Prague (1635).

(5) *Swedish-French War* (1636–48). Final success now appeared to demand only one more strenuous effort on the part of Austria; but Oxenstierna, resolved to preserve to Sweden her German acquisitions, propitiated Richelieu (q.v.) by resigning to him the direction of the war; and the

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conflict advanced into its final and most extended phase. The emperor, allied with the Lutherans, was now also assailed through his ally, Spain, who was attacked on her own frontier, in the Netherlands, and in Italy; Bernard of Weimar, fighting independently, opposed the leaguers; while the Swedes, under Baner, held North Germany, and by frequent flying marches into Silesia and Bohemia distracted their opponents, and prevented them, after their successes over Duke Bernard, from proceeding with the invasion of France. The great victory of Baner over the Austrians and Saxons at Wittstock (1636) restored to Sweden the victor's wreath; and from this time, especially under Torstensohn and Konigsmark, the Swedes were always successful, adding a second victory of Breitenfeld (1642) and one at Jankau (1645) to their already long list of successes, and carrying devastation and ruin even to the gates of Vienna. On the Rhine the leaguers at first had great success; but after the Spanish power had been thoroughly broken in the Netherlands by Condé the French were reinforced on the Rhine, and under Condé and Turenne rolled back the leaguers through the Palatinate and Bavaria, and revenged at Nordlingen (3d August 1645) the former defeat of the Swedes. The emperor was now deserted by all his allies except the Duke of Bavaria, whose territories were already mostly in the hands of Turenne and Wrangel; and a combined invasion of Austria from the west and north was on the point of being executed when, after seven years of diplomatic shuffling, the Peace of Westphalia (q.v.) put an end to this terrible struggle.

See the articles on the principal leaders in the struggle, especially Gustavus Adolphus and Wallenstein, and works there cited; Professor A. W. Ward's *Thirty Years' War* (1869), S. R. Gardiner's *Thirty Years' War* (1874); and German works by Schiller (Eng. trans. 1846), Söltl, Barthold, Gindely (Eng. trans. 2 vols. 1885), &c.

Thisbe. See PYRAMUS.

Thistle (*Carduus*), a genus of plants of the natural order Compositæ, sub-order Cynarocephalæ, with spinous leaves, imbricated involucres, and heads of flowers, consisting of tubular hermaphrodite florets alone, very rarely dicœcious, stamens free, pappus deciduous, the receptacle having chaffy bristles. The flowers are sometimes large, generally purple, rarely white or yellowish. Recent botanists have divided this genus into two genera —the True Thistle (Carduus), in which the pappus is composed of simple hairs, and the Plume Thistle (Cirsium or Cnicus), in which the pappus is feathery. The species of both genera are numerous, and are found in most of the temperate and cold parts of the northern hemisphere, annual, biennial, and perennial herbaceous plants of considerable size. The Milk Thistle (*Carduus marianus*), a biennial, native of Britain and other parts of Europe, attains a height of 4 to 6 feet, and is remarkable for the milky veins of its large waved leaves. Its blanched leaves are used in winter salads; they may also be used as a boiled vegetable, along with the young stalks, and the root is used as salsify. The plant used to be cultivated. The creeping Plume Thistle (*Cirsium arvense*, or *Cnicus arvensis*), a species about 1 to 3 feet high, with creeping roots, pinnatifid leaves and numerous dicœcious flowers, is a very troublesome weed in fields, very common in Britain, and now too common, not only in Europe, where it is indigenous, but in America (where it is called Canada Thistle) and other countries to which it has found its way; in Australia the thistle has become a serious plague. *Cirsium lanceolatum* (the Spear or Bur Thistle) and *C. palustre*, both common British plants, are also troublesome weeds. *Cirsium oleraceum* is a native of the north of Europe, but not of Britain. The Blessed Thistle (*Carduus benedictus* of the pharmacopœias, *Cnicus benedictus* or *Cirsium benedictum* of modern botanists) is a native of the Levant and of Persia, resembling in appearance a Centaurea, with yellow flowers enveloped in leaves, and abounding in a gossamer-like down; it is a powerful laxative-tonic medicine. The Cotton Thistle (Onopordon) is a distinct genus, known by its receptacles being destitute of bristles, and coarsely and deeply honeycombed. The Common Cotton Thistle (*O. acanthium*), a native of Europe, and found in England, but rarely wild in Scotland—if, indeed, it is a true native of that country—is nevertheless very generally called by gardeners and others the Scotch Thistle. The national emblem of Scotland is not, in all probability, any one species of thistle in particular, as botanically distinguished; though the Stemless Thistle (*Cnicus acaulis*, or *Cirsium*

Stemless Thistle (*Cnicus acaulis*).

acaule) is in many districts of Scotland so designated. The cotton thistle has large elliptic leaves, and a broadly-winged stem. The young fleshy root and stem are boiled and eaten. Plants of the genus Silybum, and of the genus Echinops, which belongs to a very different section of the Compositæ, are often to be seen in flower-gardens, where they are known as Thistles. The name is also, generally with some addition, very often bestowed upon many plants which have little resemblance to any of these, except in their spinous character. *Centaurea calcitrapa* is the Star Thistle (see CENTAUREA); the Jersey Thistle is *Centaurea isnardi;* the Fuller's Thistle is Teasel (q.v.); Torch Thistle, *Melocactus;* and the Golden Thistle, *Protea scolymus.* And see SOW-THISTLE, SAFFLOWER, BURDOCK, &c. Among American species are the Swamp Thistle (*Cnicus muticus*), the Tall Thistle (*C. altissimus*), and the Mexican Thistle (*Cnicus* (*Erythrolœna*) *conspicuus*). The Carline Thistle has a separate article.

Thistle, ORDER OF THE, called also the Order of St Andrew, is of no very ancient date. The earliest known mention of the thistle as the national badge of Scotland is in the inventory of the effects of James III., who probably adopted it as an appropriate illustration of the royal motto, *In defence.* Thistles occur on the coins of James IV., James V., Mary, and James VI.; and on those of the last they are for the first time accompanied by the motto, *Nemo me impune lacesset.* A collar of thistles appears on the gold bonnet-pieces of James V. of 1539; and the royal ensigns, as depicted in Sir David Lindsay's armorial register of 1542, are surrounded by a collar formed entirely of gold thistles, with an oval badge attached. This collar, however, was a mere device until the institution, or, as it is generally but inaccurately called, the revival of the order of the

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Thistle by James VII. (II. of England), which took place on May 29, 1687. Statutes were issued, and eight knights nominated by James; but the patent for the institution of the order never passed the Great Seal. After falling entirely into abeyance during the reign of William and Mary, the order

Star, Collar, and St Andrew of the Order of the Thistle.

was revived by Queen Anne, December 31, 1703, and the statutes then issued still, with some changes, govern the order. By them the word '*lacesset*' in the motto was altered to '*lacessit*.' The number of knights was originally fixed at twelve, a number raised by George IV. in 1827 to sixteen, at which it now stands. Provision was made for a Chancellor of the Order, but none has ever been appointed; the other officers of the order are the Dean, the Secretary, Lord Lyon King-of-arms, and the Usher of the Green Rod.

Thistlewood Conspiracy. See CATO STREET CONSPIRACY.

Tholen, an island in the Netherlands, constituting part of the province of Zeeland. The town of Tholen has a pop. of 2758.

Tholuck, FRIEDRICH AUGUST, theologian and preacher, was born at Breslau, 30th March 1799, and studied at Breslau and Berlin. Oriental languages first attracted him, and he somewhat paradoxically maintained the superiority of Mohammedanism to Christianity. The influence of Neander and of a pious nobleman, Von Kottwitz (a Moravian Brother), produced a marked change in his feelings; and by 1825 he was a champion of that fervid but catholic evangelical Christianity to which all his later life, lectures, sermons, and published books were a testimony. In 1824 he was appointed extra-ordinary professor of Oriental Languages at Berlin, as successor to De Wette; in 1826 he was called to Halle as ordinary professor of Theology; and there, save for a year and a half (1827–28) spent by him as chaplain to the Prussian embassy at Rome, where Bunsen was ambassador, he spent the rest of his lovable and laborious life. At first he had difficulties in Halle, the tone of the university being strongly Rationalist, and his colleagues, Gesenius and Wegscheider, were distinctly hostile to Tholuck's pietism; but ultimately he profoundly influenced the whole university in a direction favourable to devoutness, if not to old-fashioned orthodoxy. And his personal relations with the students instilled evangelical fervour into many successive generations of theological students from all parts of Germany, from Britain, and from America. Theologically he was not a strait-laced orthodoxist; he made very considerable concessions to criticism, and his line of thought was highly eclectic, containing elements from Pietism and Moravianism, from Hegel and Schleiermacher, but more still from the pectoral theology of Neander. As a writer and commentator he was rather suggestive and pregnant than profound or exhaustive. Of German theologians he is probably the one who has been most heartily accepted by English-speaking Protestants. He was a powerful preacher, and continued to lecture in spite of advancing years and enfeebled health till shortly before his death, 10th June 1877.

His earliest important work is *Die Wahre Weihe des Zweiflers* ('The True Consecration of the Sceptic,' published in reply to De Wette's *Theodore* in 1823, and frequently republished and translated with titles such as *Sin and Redemption* and *Guido and Julius*); others are an Anthology of Eastern Mysticism (1825); commentaries, which have been some of them translated into English two or three times over, on Romans, John's Gospel, The Sermon on the Mount, Hebrews, and Psalms; a reply to Strauss; *Andachtsstunden* (Eng. trans. 'Hours of Christian Devotion,' 1875); some volumes of sermons; miscellaneous essays; and contributions to church history—*Lutherische Theologen Wittenbergs* (1852), *Das Akademische Leben des 17ten Jahrhunderts* (1852–54), and the first part of a *Geschichte des Rationalismus* (1865, never finished). A complete edition of his works (11 vols.) appeared at Gotha in 1863–72; and he edited Calvin's Institutes and some of his commentaries. See a sketch by Kähler (1877); and a fuller life by Witte (2 vols. 1884–86).

Thom, WILLIAM, author of *The Mitherless Bairn* and other poems in the Scottish vernacular, was born at Aberdeen in 1799, worked as a hand-loom weaver there, at Inverurie, and elsewhere, and, after a life of much poverty and distress, died at Hawkhill near Dundee, 28th February 1848. His collected poems were first published in 1845 (new ed., with a memoir, Paisley, 1880).

Thomaby-on-Tees, the name under which South Stockton (q.v.) was incorporated in 1892. Pop. (1881) 10,665; (1891) 15,476.

Thomas, ST, 'the doubting apostle' (see John, xix. 26–29), established the church in Parthia, according to the oldest tradition, and was buried in Edessa. A later tradition carried him to India. See APOCRYPHA.

Thomas, CHRISTIANS OF ST, or Syrian Church of India, the oldest Christian church in India, numbering in 1891 some 400,000 adherents in the native states of Cochin and Travancore on the Malabar coast. The church professes to have been planted by St Thomas, but is doubtless an offshoot of the Nestorian Church of Persia (in the patriarchate of Babylon), transplanted to India about the beginning of the 6th century. Founded by missionary effort, the Indian Church was probably recruited from Persia by the struggles of Christianity with revived Zoroastrianism and the triumph of Islam. Missionaries from Rome failed in the 14th century to persuade the Indian Christians to accept the authority of Rome; but the influence of Jesuit missionaries succeeded at the Synod of Diamper (Udiamperur, 12 miles SE. of Cochin) in 1599 in nominally bringing the sectaries into the Western Church. The yoke of Rome was, however, thrown off again in 1653, under the leadership of a Syrian Jacobite metropolitan

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Gregorius. English Protestant missionaries have established no permanent relations; though dissensions amongst themselves (concerning questions of property) have had to be settled, after years of litigation, before English judges, the ancient church asserts its independence; not even recognising dependence on the patriarch of Antioch, but essentially Nestorian in theology and rites. Their sacred language is Syriac. The clergy are celibate. See GREEK CHURCH; and G. M. Rae, *The Syrian Church in India* (1892).

Thomas, AMBROISE, French musical composer, was born at Metz, 5th August 1811. He entered the Paris Conservatoire in 1828, where he carried off the first prize for piano playing in 1829, for harmony in 1830, following up these two successes by gaining the Grand Prix for musical composition in 1832. Before he had reached the age of twenty-six Thomas had produced a cantata, a *Messe de Requiem* for orchestra, and numerous pieces for pianoforte, violin, and orchestra. His first success in opera was with *La Double Échelle* in 1837, followed by *Mina* (1843), *Betty* (1846), *Le Caïd* (1849), *Le Songe d'une Nuit* (1850), *Le Carnaval de Venise* (1853), *Mignon* (1866), *Hamlet* (1868), *Françoise de Rimini* (1882), with innumerable other operas, cantatas, part-songs, and choral scenas. Thomas was appointed a member of the Institute in 1851, professor of Composition in 1852, and succeeded Auber as director of the Conservatoire in 1871. He received the Grand Cross of the Legion of Honour in 1880.

Thomas, ARTHUR GORING, born near Eastbourne, 21st November 1851, was educated for the civil service, but took up the study of music at the Paris Conservatoire (1875–77), and then for three years at the Royal Academy of Music, London, and wrote the operas *Esmeralda* (1883) and *Nadeshda* (1885), the cantata *Sun-worshippers* (1881), and many songs. He committed suicide 22d March 1892.

Thomas, GEORGE HENRY, an American general, was born in Virginia in 1816, graduated at West Point and entered the artillery in 1840, gained a brevet for gallantry against the Indians in Florida in 1841, and two others at Monterey and Buena Vista in 1846–47, and in 1855–60 served in Texas as a major of cavalry. In 1861 he was appointed brigadier-general of volunteers, and sent to Kentucky to turn backwoodsmen into soldiers; and with them in January 1862 he won the battle of Mill Springs. He was raised to major-general in April, and in October received the command of five divisions, forming the centre of Rosecrans' army, with which he saved the battle of Stone River (see MURFREESBOROUGH); and at Chickamauga (q.v.) again it was the centre that stood firm, and rendered the victory a barren one for the Confederates. In October 1863 Thomas was given the command of the Army of the Cumberland, and in November led it to the capture of Mission Ridge. In 1864 he commanded the centre in Sherman's advance on Atlanta, and then was sent to oppose Hood in Tennessee; and there in December, with troops that he had had to reorganise, he won the battle of Nashville, and destroyed the last considerable Confederate army in the south-west. For this he was appointed major-general in the United States army, and received the thanks of congress. He afterwards was in command of the military division of the Pacific, and died at San Francisco, 28th March 1870. Thomas was of a nature kindly, gentle, and singularly modest, of unswerving loyalty, and of sterling integrity; a soldier trained in nearly every arm of the service, he won and held without an effort the confidence of all who served under him. There is a bronze equestrian statue at Washington. See the Life by Van Horne (New York, 1882).

Thomas à Becket. See BECKET.

Thomas à Kempis. See KEMPIS.

Thomas Aquinas. See AQUINAS.

Thomas-Gilchrist Process. See STEEL.

Thomasites. See CHRISTADELPHIANS.

Thomasius, CHRISTIAN, a German philosopher and jurist, was born at Leipzig, 1st January 1655, studied at Frankfort-on-the-Oder (1675–79), and returning to his native town commenced to lecture on law in a style perfectly free from the pedantry of the schools. In 1687, to the astonishment of his Latin-speaking colleagues, he adopted the German language as the vehicle of his expositions, published his programme for the following year in the same tongue, and commenced an unconventional monthly journal. But this work and his advanced views on theological subjects excited so much opposition that he was forced to leave Leipzig, and went first to Berlin, and afterwards (1690) to Halle, where, under the patronage of the Brandenburg court, his lectures were the means of establishing a university, since famous. In this university Thomasius became professor of Jurisprudence, and here he died, 23d September 1728. It is to his credit that he broke away completely from traditional pedantry and mediæval terminology, and introduced better methods into the scientific treatment of various departments of study; and he honourably signalised himself as a courageous opponent of trial for witchcraft and the use of torture. The characteristic features of his mode of thought are contained in his *Gedanken und Erinnerungen* (3 vols. Halle, 1723–26) and in his *Geschichte der Weisheit und Thorheit* (1693). His specialty was international law (*jus naturale*) and ethics. See works on him by Luden (1805), Dernburg (1865), Wagner (1872), and Nicoladini (Berlin, 1887).

Thomas the Rhymer, a name given to the earliest poet of Scotland. The history of his life and writings is involved in much obscurity; but it is generally believed that Thomas Rymour of Ercildoune was the person whose poems and prophecies were extensively known among the people of Scotland at an early period. The Rhymer derived his territorial appellation from the village of Ercildoune (now Earlston), in the county of Berwick. The time of his birth is unknown; but he appears to have reached the height of his reputation in 1286, when he is said to have predicted the death of Alexander III. (q.v.), as recorded in Bower's continuation of the *Scotichronicon*. The Earl of Dunbar, having questioned the Rhymer as to what kind of weather was to be on the morrow, was answered that on that day before noon should be the greatest storm of wind that ever was heard in Scotland. Next day towards noon, the weather being calm, Dunbar expressed a doubt as to the truth of the prediction, when the Rhymer said: 'It is not noon yet;' and immediately thereafter a messenger arrived with the tidings of the king's accidental death at Kinghorn on the previous evening. From this and other prophecies the Rhymer became popularly known as 'True Thomas,' and was believed to have derived his skill from his intercourse with the Queen of Fairyland. The legend bears that he was carried off to Fairyland, and after three years' residence there was permitted to revisit the earth, but still remaining bound to return to his royal mistress when she should intimate her pleasure. Accordingly, one day, when a hart and hind were seen pacing the street of the village, the Rhymer instantly rose and followed them to the forest, never to return. (Compare the myth of TANNHÄUSER.)

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The earliest historical document referring to Thomas Rymour of Ercildoune is a charter of Petrus de Haga of Bemersyde, to which the Rhymer's name is appended as a witness; its date is about 1260–70. Again, in a charter of 1294, Thomas of Ercildoune, describing himself as 'son and heir of Thomas Rymour of Ercildoune,' conveys his lands in the village of Ercildoune to the Trinity House of Soltra. From this it has been inferred that the Rhymer was now dead; although Blind Harry, in his *Wallace*, speaks of him in 1296 or 1297 as then 'in to the faile'—the Cluniac priory of Fail in Ayrshire, by Dr Murray's conjecture. The Rhymer is also alluded to by Wynton in his *Chronicle*. Boece calls him Thomas Learmont, and the Russian poet Lermontoff claimed him for an ancestor; but there is no contemporary authority for this surname. Whether Rymour was a family surname or a personal appellation derived from his poetical reputation has also been discussed. The fact that his son, in the charter above referred to, applies the name to his father, but does not take it himself, seems to favour the latter view.

The Rhymer's prophecies were first collected and published in Edinburgh by Waldegrave in 1603. Sir Walter Scott (so also Mr M'Neill) believed him to be the author of the famous romance of *Sir Tristrem*, because his name occurs along with that of the romance in an ambiguous passage in the poems of Robert of Brunne (*c.* 1338). But the romance is now generally believed to have had a French origin, and to be of earlier date than the time of the Rhymer. The other poems attributed to him are chiefly descriptive of his interviews with the Fairy Queen and his adventures in Fairyland; they display poetical power of a very high order.

See *The Romances and Prophecies of Thomas of Ercildoune*, edited by Dr J. A. H. Murray for the Early English Text Society (1875); editions of *Thomas of Ercildoune* by Alois Brandl (Berlin, 1880); *Sir Tristrem*, by Scott (1804), by Kölbing (Heilbronn, 1882), by G. P. M'Neill for the Scottish Text Society (1886); and Professor Child's *Popular Ballads* (part ii. 1884).

Thomasville, capital of Thomas county, Georgia, 200 miles by rail WSW. of Savannah, with boys' and girls' colleges, foundries, &c. Pop. (1880) 2555; (1890) 5514.

Thomists. See AQUINAS.

Thompson, BENJAMIN. See RUMFORD.

Thompson, ELIZABETH. See BUTLER, p. 584.

Thompson, WILLIAM HEPWORTH, Master of Trinity, was born at York in 1810, studied at Trinity College, Cambridge, became regius professor of Greek in 1853, and in 1866 succeeded Whewell as master of his college. A brilliant classical scholar and a profound student of Greek philosophy, he projected a great edition of Plato, but accomplished only the *Phædrus* and *Gorgias*, so that, though by his teaching he left an enduring mark on Cambridge scholarship, he is chiefly remembered by a few incomparable sarcasms. He died 1st October 1886.

Thoms, WILLIAM JOHN, a genial and accomplished antiquary and bibliographer, was born in Westminster, 16th November 1803, and began life as a clerk in the Chelsea Hospital. After twenty years of service there he was attached as a clerk to the House of Lords, and was appointed its deputy-librarian in 1863, a post which he resigned from old age in 1882. He died in London, August 15, 1885. Thoms was elected F.S.A. in 1838, was secretary of the Camden Society from 1838 till 1873, founder of *Notes and Queries* (1849), and its editor down to 1872. His happiness in hitting on names is illustrated in the name and motto of this famous little paper, and in the name supplied (*Athenæum*, August 1846) to the new subject of study, 'folk-lore.' His published writings by no means suggest the range of the vast stores of out-of-the-way knowledge which he possessed and was ever ready to communicate to others. His books include *A Collection of Early Prose Romances* (3 vols. 1828; enlarged ed. 1858); *Lays and Legends of Various Nations* (4 vols. 1834); *Book of the Court* (1838); *Anecdotes and Traditions illustrative of Early English History and Literature* (Camden Soc. 1838); *Three Notelets on Shakespeare* (1864); *Hannah Lightfoot, Queen Charlotte, and Chevalier D'Eon* (1867); *Human Longevity: its Facts and its Fictions* (1873); besides a translation of Worsaae's *Primeval Antiquities of Denmark* (1849), and an edition of Stow's *Survey of London* (1875).

Thomson, SIR CHARLES WYVILLE, zoologist, was born at Bonsyde, Linlithgow, March 5, 1830, and had his education at Merchiston Castle school and the university of Edinburgh. In 1850 he began to lecture on botany at Aberdeen, in 1853 he was appointed to the chair of Natural History in Queen's College, Cork, in 1854 of Mineralogy and Geology in Queen's College, Belfast, and in 1870 to that of Natural History in the university of Edinburgh. He conducted scientific dredging expeditions in the *Lightning* and *Porcupine* (1868–69), and was scientific head of the famous *Challenger* voyage of 68,900 miles for deep-sea explorations (1872–76). He was knighted in 1876, presided over the geographical section of the British Association at Dublin in 1878, and died at Edinburgh, 10th March 1882. His books were *The Depths of the Sea* (1872) and *The Voyage of the Challenger*, a preliminary account of its general results (2 vols. 1877). See CHALLENGER.

Thomson, GEORGE, song-collector and friend of Burns, was born at Limekilns, Fife, about 1759, and educated at Banff, but at seventeen removed to Edinburgh, where he received a clerkship to the Board of Trustees. He rose to be principal clerk, a post which he held for sixty years. In 1792 he formed the idea of collecting every existing Scotch melody, and of giving to the world 'all the fine airs both of the plaintive and lively kind.' The result appeared in six volumes of Scotch songs, followed by two of Irish songs, and three of Welsh melodies. A large number of well-known authors were engaged to supply words to the melodies—among them Thomas Campbell, Professor Smyth, Sir Walter Scott, and Joanna Baillie—but the most prolific writer was the poet Burns, who contributed over 120 songs to the collection. Besides the pianoforte accompaniment, according to Thomson's arrangement, each song was to have a prelude and coda, with accompaniments for violin, flute, and violoncello. For this portion of the *magnum opus* Thomson secured the services of Pleyel, Kozeluch, Haydn, Beethoven (who received £550 for his share of the work), Mozart, Weber, Hummel, Hogarth, and Bishop. Their compositions were pronounced by the *Edinburgh Review* to be wholly unrivalled for originality and beauty. The first volume was published three years after the death of Burns. Thomson died at Leith in 1851, aged ninety-two. See the autobiographical sketch in *The Land of Burns* (1840).

Thomson, JAMES (1700–48), poet, was one of the nine children of the parish minister of Ednam, Roxburghshire, where he was born 11th September 1700. He was educated first at Jedburgh, and then at the university of Edinburgh, where he studied for the church. From his earliest years he had written poetry, though he is said to have, with uncommon discretion, regularly burned his juvenile efforts. Soon after his father's death, deserting

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theology for letters, he removed to London provided with little money but much manuscript. Where and how he lived at first is not quite clear, but in 1726 he began with *Winter* the publication of his poem on the *Seasons*. The copyright brought him only three guineas, but Lord Wilmington, to whom it was dedicated, fulfilled the expected duty of a patron by presenting him with twenty guineas. The piece was immediately successful, and Thomson's place as a poet was assured. *Summer* and *Spring* followed in the next two years. The second of these is inscribed to the Countess of Hertford, who invited the author to her country-seat 'to hear her verses and assist her studies.' Johnson records that 'he took more delight in carousing with Lord Hertford and his friends,' and that the lady was in consequence exceedingly indignant. In 1730 *Autumn* completed the *Seasons*. It was published with his collected works, which now included a *Poem on the Death of Sir Isaac Newton*, and *Britannia* (1727), a tirade against Spain's interference with English commerce, and a eulogy of Frederick, Prince of Wales, then in opposition to the court. In 1729 his tragedy of *Sophonisba* was produced. The audience was numerous and splendid, but 'nobody was much affected.' One luckless line, 'O Sophonisba, Sophonisba O,' is still remembered for the famous parody, 'O Jemmy Thomson, Jemmy Thomson O,' which, repeated by everybody, killed what little life there was in the piece. His other tragedies were *Agamemnon* (1738), *Edward and Eleonora* (1739), *Tancred and Sigismunda* (1745, in which Garrick and Mrs Cibber played the principal parts), and *Coriolanus* (produced after his death to pay his debts and aid his sisters). In 1731 Thomson was chosen to accompany Charles Talbot, son of Lord Chancellor Talbot, on the conventional continental tour, then a necessary part of the education of a young man of quality. The travellers visited France, Switzerland, and Italy, and something at least of the improvement in the poet's later work may be ascribed to the fresh impressions received on this delightful journey. On his return Lord Talbot gave him the sinecure office of Secretary of Briefs, but first the son and then the father died, and a new favourite got the appointment. He was not long destitute. The poem of *Liberty* (1732), inspired by his travels, was dedicated to the Prince of Wales, who was induced by Lyttleton to see Thomson. The result of the interview was a pension of £100 a year. He afterwards obtained the appointment of surveyor-general of the Leeward Islands. A deputy did what work there was to be done, and Thomson pocketed £300 a year. In 1740 the *Masque of Alfred* was produced at Cliffden before the Prince and Princess of Wales. It contains the song *Rule Britannia*, still, for want of a better, the popular patriotic ode. Thomson's last years were spent at Richmond, where English scenery is seen at its best. Here he finished his finest work, *The Castle of Indolence*. It was published May 1748. He died on 27th August following. As a man he was kindly, easy, gay, indolent, and of a rare modesty. No wonder he was universally popular. Stanza lxviii. Canto 1 ('written by a friend of the author'—Lord Lyttleton) of his last work pictures him as 'more fat than bard beseems,' as 'void of envy, guile, and lust of gain,' as all

> The world forsaking with a calm disdain,
> Here laughed he careless in his easy seat;
> Here quaff'd encircled with the joyous train,
> Oft moralising sage: his ditty sweet,
> He loathed much to write, nor cared to repeat.

Thomson's poems bear traces of minute and accurate observations of nature at first hand. His impressions were received early, for it is the rustic sights and sounds of the Border that are most prominent in his verse. He was not without a quaint if sometimes coarse humour. He has long passages of pleasing melody, though the exquisite note in his description of the Hebrides, 'placed far amid the melancholy main,' is but rarely heard. His thought is usually conventional and commonplace. No real feeling pulsates through his verse. He is verbose and straggling beyond endurance. His best work is professedly based on and full of echoes of Spenser; but that only reminds us how far the *Castle of Indolence* is below the *Faery Queen*. When Lyttleton said he wrote 'no line which dying he could wish to blot,' he spoke of him as a moralist, not as an artist. There are numerous editions of Thomson. Brief Lives are extant by his contemporaries J. Murdoch and Dr Johnson, later ones by Gilfillan and W. M. Rossetti. A selection, edited by J. Logie Robertson, is included in the Clarendon Press publications (Oxford, 1891).

Thomson, JAMES, the poet of despair, was born a sailor's son at Port-Glasgow on the Clyde, 23d November 1834, and educated in an orphan asylum, where he was trained for service as an army schoolmaster; but through his friend Bradlaugh (q.v.) he became from 1860 onwards a contributor to the *National Reformer*, in which many of his sombre, powerful, and sonorous poems—including 'The City of Dreadful Night' (1874)—first appeared. In 1862 he became a lawyer's clerk; he went to America as a mining agent; was war-correspondent with the Carlists; and from 1875 to the end of his life depended for livelihood largely on contributions to a monthly published by a tobacconist firm. Afflicted in body and profoundly gloomy in mind, he suffered sorely from the seductions both of narcotics and stimulants; and he died in the University College Hospital, 3d June 1882. *The City of Dreadful Night and Other Poems* was published as a book in 1880, praised by the critics and read by the public; and was followed by *Vane's Story, Essays and Phantasies, A Voice from the Nile* (1884, with memoir by Bertram Dobell), and *Shelley, a Poem* (1885). Thomson's pessimism was not academic, but the only too real and dark despair of a morbidly gloomy soul; his monotonously melancholy verses, not seldom tediously verbose, are occasionally varied by a burst of sarcasm or a brief dash of preternatural brightness. See H. S. Salt's *Life of James Thomson*, '*B. V.*' (1889).

Thomson, JOHN, minister of Duddingston and landscape-painter, was born 1st September 1778 at Dailly in Ayrshire, and, in spite of his wishes to be an artist, was trained to follow the sacred profession of his father and grandfather. He completed his theological studies in Edinburgh, taking some lessons, however, from Nasmyth, the painter, and in 1800 became his father's successor at Dailly. Hence in 1805 he was transferred to the parish of Duddingston near Edinburgh, where, along with the faithful performances of parochial duties, he found time to paint the large series of landscapes in virtue of which he ranks amongst the best, as he was the first of Scottish landscapists. His style, though characteristic, reflects the influence of the Dutch, French, and Italian schools. He died 27th October 1840.

Thomson, JOSEPH, traveller, was born at Thornhill in Dumfriesshire in 1858, studied at Edinburgh University, and went as geologist with the Royal Geographical Society's expedition to Lake Tanganyika under Keith Johnston in 1878. On the death of his chief on the coast (1879), Thomson took the command of the expedition, and carried it out with great success. Put at the head of another expedition of the society in 1882, he

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passed through the Masai country, visited Mount Kenia, Lakes Naivasha and Baringo, and Mount Ligonyi. In the service of the National African Company he made an eminently successful journey on the Niger and to Sokoto, the result of which was a great extension of British influence. For the Geographical Society he explored southern Morocco; in 1888 he made another journey in South Africa for a company. Among his works are *To the Central African Lakes and Back* (1881); *Through Masai Land* (1885); *Ulu, an African Romance* (with a collaborator, 1888); *Travels in the Atlas* (1889); and Life of Mungo Park (1891).

Thomson, WILLIAM, Archbishop of York, was born 11th February 1819, and studied at Shrewsbury and Queen's College, Oxford. After holding various cures and acting as college tutor, he was in 1845 elected provost of his college. In 1861 he became Bishop of Gloucester and Bristol, and in 1862 Archbishop of York. The best known of the works of this judicious and liberal-minded prelate is his *Outline of the Laws of Thought* (1848), which was followed by several collections of sermons and papers. He died on Christmas Day 1890. See the *Quarterly Review* for April 1892.

Thomson, WILLIAM (Lord Kelvin), one of the most brilliant natural philosophers of the 19th century, was born in Belfast in June 1824. At Cambridge he highly distinguished himself as an original thinker even in his undergraduate days. He was second wrangler and first Smith's prizeman of 1845, and shortly after was elected to a fellowship in St Peter's College. In 1846 he became professor of Natural Philosophy in the university of Glasgow, where his father had been professor of mathematics. All his numerous writings have the stamp of originality in a marked degree. Perhaps the most remarkable of his earlier papers, published in 1842, is the one in which he solves by an analogy derived from the conduction of heat important problems in electrostatics. To him also we owe the solution of the problem of the transmission of electric currents in submarine cables. It was in this connection that he first came prominently before the public, for it was largely through his refined researches that the Atlantic cable was so soon a realised idea. On the successful completion of the cable in 1866 he was knighted. In 1892 he was created a peer with the title of Lord Kelvin. As an inventor of accurate and delicate scientific instruments Lord Kelvin is *facile princeps*. His electrometers of various design—absolute, portable, quadrant, &c.—embody the perfection of mechanical and geometrical adjustment. More recently he has constructed ampere-meters, volt-meters, and watt-meters, suitable alike for the electrical workshop and laboratory. His sounding apparatus and Compass (q.v.) have been adopted by the Admiralty and the principal mercantile lines. In pure science Lord Kelvin has done incomparable work. Specially may be mentioned his thermodynamic researches from 1848 onwards, including the doctrine of the dissipation or degradation of Energy (q.v.); his magnetic and electric discoveries, including general theorems of great value and the beautiful method of electric images, which has proved such a power in all similar investigations; and his work in hydrodynamics, more especially in wave-motion and in vortex-motion. Basing upon the phenomena of gyrostatic motion (see GYROSCOPE) he has imagined a kinetic theory of inertia of high interest; and his dynamical theory of dispersion, and indeed all his views on the nature of the Ether (q.v.) are full of suggestiveness. In 1872 his electrostatic and magnetic papers were reprinted in collected form (2d ed. 1884); and his other papers have been similarly published under the title *Mathematical and Physical Papers* (vols. i.–iii. 1882–90), besides two volumes of popular lectures (1890–92). He is joint author with Professor Tait of *A Treatise on Natural Philosophy* (vol. i. 1867; 2d ed. in two parts, 1879), a work which, though never completed, has had an incalculable influence on the progress of physical science. He was president of the British Association (1871), twice president of the Royal Society of Edinburgh (1887–90), and then president of the Royal Society of London. He has been awarded the Royal and Copley Medals of London and the Keith Prize and the Jubilee Medal of Edinburgh, and is a member of the Institute of France.

JAMES THOMSON, LL.D., F.R.S., elder brother of Lord Kelvin, succeeded Rankine in 1872 as professor of Engineering in the university of Glasgow. He retired in 1889, and died May 8, 1892. He was an authority on hydraulics, and invented the inward flow vortex turbine. In pure science he is best known as the discoverer of the effect of pressure upon the freezing-point of water. His various papers on elastic fatigue, on under-currents, on trade-winds, and other subjects are all marked by a distinct originality of treatment.

Thor, the god of thunder, was the son of Odin and Earth (Yörd); his wife was Sif. His palace, supported on 540 pillars, was called Thrudvang. Thunder was caused by the rolling of his chariot. He was in the vigour of youth, had a red beard, and was the strongest of all gods and men; the gods even called in his assistance when they were in straits. He was in particular a terror to the Giants (q.v.), with whom he was perpetually at strife, and whom he struck down with his hammer Mjolner, which had the property of returning to his hand after being hurled. The name of Thor was wide-spread; the Anglo-Saxons worshipped him as Thunar, the High Germans as Donar. As rude force is the predominating element in Thor, the humorous element of the Scandinavian belief attaches to him. Thus the giants often blinded him by magic, and made fun of him; yet he always shows his extraordinary strength in these cases, and in the long run his opponents are invariably overcome by the hammer. Thursday is so called from Thor; and the name survives in numerous names of places (Thunderfield in Surrey; Thundersley in Essex; Thurso), and also in personal names (Thorburn; in Scand. Thorbiörn, 'son of Thor'). See SCANDINAVIAN MYTHOLOGY.

Thoracic Duct. See LYMPHATICS.

Thorax. See CHEST.

Thoreau, HENRY DAVID, a New England author, born in Concord, Massachusetts, July 12, 1817, and died there May 6, 1862. Copyright 1892 in U.S. by J. B. Lippincott Company. Concord is a pretty rural village about 20 miles NW. of Boston, and is noted as having been the home of Emerson, the Alcotts, Hawthorne, and Thoreau, the latter, however, being the only one of the group born there. Thoreau's father, John Thoreau, was of French extraction. He was a merchant in Boston, and finally a lead-pencil maker in a small way in Concord, where he died in 1859. He is described as a small, deaf, and unobtrusive man, plainly clad, and minding his own business; very much in contrast with his wife, who was not small, nor unobtrusive, and who did not always succeed in confining her attention to her own business. Henry was the third of four children—John, Helen, Henry, and Sophia—all people of character and mark. 'To meet one of the Thoreaus,' says Mr Sanborn, the biographer of Henry, 'was not the same as to encounter any other person who might cross your path.' Helen and John were both teachers, and died comparatively young. Helen was evidently a

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fine nature. It was part of her earnings as teacher that helped to pay Henry's expenses at Harvard College, where he was graduated in 1837.

Henry did not distinguish himself in college. In his senior year he is said to have 'lost rank with his instructors by his indifference to the ordinary college motives for study.' After graduating he became a teacher, and was for a time employed in the academy at Concord where he had been a pupil. He seems to have begun his career as a lecturer when about twenty-one years of age, first appearing before the lyceum of his native village. He soon gave up teaching, and joined his father in making lead-pencils. But to this employment he did not stick. Having mastered the art, Emerson says, he had no further interest in it. He probably began his walks and studies of nature as the serious occupation of his life about this time—i.e. in 1838 or 1839. In August 1839 he made his voyage down the Concord and Merrimac rivers in company with his brother John. Out of this voyage came his first book, *A Week on the Concord and Merrimac Rivers*, published ten years later. The *Week* is a collection of essays on religious literature and philosophical themes, tied together by a slight thread of travel. Thoreau early made the acquaintance of Emerson, and in 1841–43 was a member of his household, having charge of the garden and doing other work for his friend. When Emerson made his visit to England in 1847, Thoreau again lived with the Emerson family. In 1845 Thoreau borrowed Mr Alcott's axe, and went and built himself a shanty in the woods by Walden Pond on land owned by Mr Emerson. He went there, he said, for seclusion and solitude that he might the better study nature and become acquainted with himself. Here he seems to have written much of the *Week*, his essay on Carlyle, and many others of his papers. While here he demonstrated to himself that a man can support himself on less than $100 per year and have two-thirds of his time to himself. He spent nearly two years at Walden. He says: 'I left the woods for as good a reason as I went there.' Out of his experience has come his most popular book, *Walden, or Life in the Woods* (1854), one of the freshest and most stimulating books in American literature.

After the Walden episode he supported himself in various ways, such as a job here and there at whitewashing, gardening, fence-building, and land-surveying. He also had a call to lecture now and then, and he wrote for the current magazines. He made three trips to the Maine woods in 1846, 1853, and in 1857, where he saw and studied the moose and Indians. His papers which were the outcome of these trips were published in book form after his death (1864), and next to *Walden* form his most valuable and interesting volume. In 1850 he made a trip to Canada with his friend Ellery Channing, out of which trip came his posthumous volume, *A Yankee in Canada* (1866). Thoreau began to keep a daily journal of his walks and observations in 1835. These journals swelled to thirty volumes before he died, and are a complete record of what he saw and what he thought. They seem to have been written and revised with great care, and are rich in fine thoughts, graphic descriptions, and fresh natural history notes. Since his death three volumes have been published from them: *Early Spring in Massachusetts* (1881), *Summer* (1884), and *Winter* (1887). Thoreau died of consumption, sitting up in bed on a morning in early May, and as gently as if going to sleep. Since his death, beside the volumes already named, there have been published from his lectures and magazine articles *Excursions in Field and Forest*, with a biographical sketch by Emerson (1863), and *Cape Cod* (1865). In 1865 a volume of his letters was published under the title of *Letters to Various Persons*, which also included nine of his poems. Thoreau wrote a good many poems, but destroyed most of them on the advice of Emerson. His poetry was much more Emersonian than his prose. He was early brought under Emerson's influence, and in both his manners and his habit of mind that influence was marked. Yet his writings are crisp and tonic, and in the literature of New England perhaps rank second in importance to those of his illustrious neighbour and friend. See Lives by H. A. Page, F. B. Sanborn (1882), H. S. Salt (1890).

Thorium (sym. Th, equiv. 231·5) is a rare metal resembling aluminium, but taking fire below a red heat, and burning with great brilliancy. *Thoria*, ThO_2, the oxide, is remarkable for its high specific gravity, 9·2. Thorium was discovered in 1829 by Berzelius in an earth to which he had given the name *Thoria*, and which occurs in a rare black Norwegian mineral termed *Thorite*. None of the compounds of this metal are of any practical importance.

Thorn. See THORNS, HAWTHORN, SLOE, BUCKTHORN.

Thorn (Pol. *Torun*), a strongly-fortified town in the province of West Prussia, on the right bank of the Vistula (here spanned by a viaduct 1100 yards long), 31 miles by rail ESE. of Bromberg. Founded by the Teutonic order in 1231, and a member of the Hanseatic League, Thorn contains a town-hall and a number of other buildings remarkable for their beautiful gables and interiors; became a Polish town in 1454; and was annexed to Prussia in 1793, and again finally in 1815. It became an important fortified stronghold in the 17th century; was five times besieged between 1629 and 1813; and since 1878 has been made a fortress of the first rank by Prussia, the old fortifications being removed, and a series of detached forts built. Copernicus was a native; and a colossal bronze statue of him was erected in 1853. An active trade in corn and timber is carried on. Pop. (1890) 26,712, of whom two-fifths are German Protestants, the remainder mainly Polish Catholics, with 1200 Jews.—THE CONFERENCE OF THORN, an effort to explain away the differences between Catholics and Protestants, with a view to reunion, was originated by Ladislaus IV. of Poland. It met 28th August 1645, soon lapsed into disputation and controversy, and broke up without result, 21st November 1645.

Thorn-apple (*Datura*), a genus of plants of the natural order Solanaceæ, having a tubular five-cleft calyx, a large funnel-shaped five-lobed corolla, a two-laminated stigma, and an imperfectly four-celled, prickly, or unarmed capsule. The species of this genus are annual herbaceous plants, rarely shrubs or trees; they are in general narcotic, and productive of wild excitement or delirium. The common Thorn-apple, or Stramonium (*D. stramonium*), is an annual plant, with smooth stem and leaves, white flowers, and erect prickly capsules, a native of the East Indies, but now often met with in Europe, as also in Asia, the north of Africa, and North America. It contains a peculiar alkaloid, *Daturine*, which is practically identical in its action with atropine. The leaves and seeds are employed in medicine (see ASTHMA). The dried leaves have a faintly narcotic smell, and an unpleasant bitter taste; the seeds, which are of a black colour, are still more poisonous. A variety with pale violet flowers and purplish violet stem is frequently cultivated in gardens as an ornamental plant. Still more narcotic is the Soft-haired Thorn-apple (*D. metel*), a native of the south of

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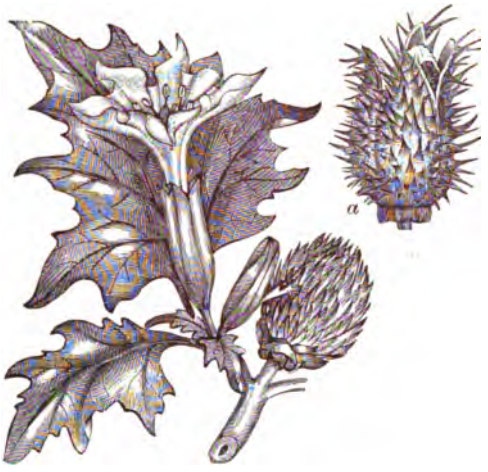
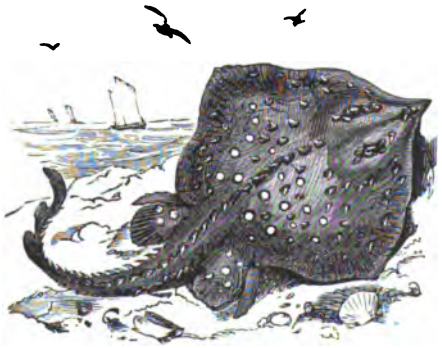
Asia and of Africa. The Thugs (q.v.) of India employed it in order to stupefy their victims, or, in other cases, to poison them outright. From its seeds, along with opium, hemp, and certain spices, a strong intoxicating substance is prepared, which the Mohammedans of India use in order to produce in themselves an indescribable joyfulness and extremely pleasurable feeling for a short time;



Common Thorn-apple (*Datura stramonium*): *a*, ripe fruit.

but the use of it destroys the constitution. *D. tatula*, another Indian species, has similar properties, and is very energetic. *D. sanguinea*, the red thorn-apple of Peru, is used by the Indians to prepare a very powerful narcotic drink called *tonga*, which stupefies when very diluted, and when strong brings on maniacal excitement. The beautiful *D. fastuosa* has flowers externally of a violet colour, and white within, and is cultivated as an ornamental plant, especially a variety with what are called double flowers, which consist rather of two corollas, one within the other. *D. arborea*, a native of Peru and Colombia, has begun to be also very generally cultivated in flower-gardens in Europe. It has very splendid pendulous white flowers, 9 to 12 inches long, which diffuse a sweet smell in the evening and at night.

Thornback (*Raia clavata*), a species of ray or skate, common on most parts of the British coast. It attains a large size; the snout or fronto-nasal



Thornback (*Raia clavata*).

process is short, and the form is nearly rhombic. The upper surface is brown, with lighter spots, the under surface white. The upper surface is rough with minute sharp scales, and has numerous nail-like crooked spines, each with an oval bony base. A few strong spines may also occur on the ventral surface, especially in the female. In the male the teeth are pointed, in the female flat. The thornback is used as food, particularly in autumn and winter, but is most abundantly captured in spring and summer, when it approaches the shore to deposit its eggs.

Thornbury, GEORGE WALTER, was born in London, a solicitor's son, in 1828, and, after studying art for a while, at seventeen began writing for the *Bristol Journal*. He soon settled in London, and published between twenty and thirty novels, books of travel, and other works, among them the fiery *Songs of the Cavaliers and Roundheads* (1857), *As the Crow Flies* (1859), *Life of Turner* (1861), *Historical and Legendary Ballads* (1875), and vols. i. and ii. of *Old and New London* (completed by E. Walford, 1872–78). He died 11th June 1876.

Thornhill, a town in the West Riding of Yorkshire, 1½ mile S. of Dewsbury, with an old church. Pop. (1881) 8843; (1891) 9606.

Thornhill, SIR JAMES (1676–1734), historical painter and sergeant-painter to Queen Anne, decorated the dome of St Paul's, executed paintings for Blenheim, parts of Hampton Court, and Greenwich Hospital. Of his easel-pictures the best known is the view of the House of Commons in 1730; and he executed a few portraits, some etchings, and good copies of Raphael's cartoons. He founded a successful drawing-school, his most famous pupil being Hogarth, his future son-in-law. Knighted by George I. in 1715, he sat in parliament as member for his native borough of Melcombe Regis.

Thorns, or SPINES, are hard, pointed, woody structures. They are metamorphosed leaves or parts of leaves, as is shown by their position on plants; for lateral buds occur in their axils—i.e. in the angle made by them with the internodes (parts of stem) above their insertions, which is one of the characteristics of leaves. In the Barberry the compound spines are entire metamorphosed leaves; in *Robinia pseudacacia* the spines are metamorphosed stipules, parts of the leaf-sheathes; in many species of Caragana and Astragalus they are pointed persistent petioles (leaf-stalks). The thorns of the Blackthorn and Hawthorn are pointed branches; in the Furze (whin) they are both pointed leaves and stems. They are to be distinguished from Prickles (q.v.), which are merely pointed projections of the epidermis, and are therefore to be compared with hairs and surface-glands. Spines, and prickles also, tend to disappear from plants under cultivation—i.e. from plants that are growing luxuriantly; and conversely, they tend to increase in plants growing in unfavourable conditions. These and other facts have led to the theory that spines in general are an expression of the 'ebbing vitality of a species,' and not, as is usually thought, the result of a process of natural selection which has caused them to be evolved as protections against mammals. But this theory has been severely criticised by Mr A. R. Wallace in his *Darwinism*, who argues that spinous plants are vigorous and have an extensive range; and, further, that they are very rare or entirely absent from those districts, oceanic islands for instance, where there are few or no mammals, which is what the theory of their selection as protective organs would lead one to expect; and genera which have many spinous species in other countries have no such representatives in oceanic islands.

Thornycroft, HAMO, R.A., sculptor, was born in London, 9th March 1850, and studied at the Royal Academy schools. 'Artemis' (1880) was

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his first success; others were 'Teucer' (1881), 'The Mower' (1884), and the portrait statues of General Gordon in Trafalgar Square (1885) and of John Bright at Rochdale (1892).

Thorough Bass means either what has, as *figured* bass, been explained at ACCOMPANIMENT—a bass voice-part written at length, with numerals written below (or above) it to indicate the chords of the harmony; or, more loosely, the science of harmonic composition. See HARMONY, COUNTERPOINT.

Thorpe, BENJAMIN (born 1782; died at Chiswick, 19th July 1870), edited numerous Anglo-Saxon texts, and was the author of *Northern Mythology* (3 vols. 1852).

Thorwaldsen, BERTEL, sculptor, was born at sea on the 19th November 1770. His father, an Icelander, was on his way to Copenhagen, where he settled as a carver of figure-heads for ships; and the son was brought up to the same profession. But from his eleventh year the boy attended art classes, and in 1793 he gained the first gold medal for design at the Academy of Copenhagen, and along with it the privilege of three years' residence abroad for the purpose of study. Accordingly, in 1796 he sailed for Rome, whose collections kindled in him the undying ambition to revive the glories of sculpture as practised by the ancient Greeks. From Canova he had early and generous recognition; and shortly, by the model for a 'Jason,' he secured reputation. No purchaser could, however, be found for it till, in 1803, just as in hopeless disgust the artist was about to return to Copenhagen, he received from 'Anastasius' Hope a commission for its production in marble. From this time forward prosperity and fame flowed upon him in full tide. In 1819 he returned to Denmark, where his reception was triumphal. He remained at home but a year, and then returning to Rome continued to prosecute his art assiduously up to 1838, when he again departed, to pass his remaining years in his own land. Its climate, however, proved no longer suitable to him, and the year 1841 found him once more at Rome. In 1844, having revisited Copenhagen to complete some of his works there, he died suddenly in the theatre, of disease of the heart, on the 24th March. All the works remaining in his possession he bequeathed to his country, to be preserved in a museum bearing his name, for the maintenance of which he also left the bulk of his fortune, reserving a sufficient provision for his natural daughter; and this collection is now one of the chief glories of Copenhagen. Thorwaldsen's strength lay in classical and mythological subjects; he imitated with wonderful success the antique conceptions, or even may be fairly said to have reproduced classic art. His efforts in Christian subjects, even the famous 'Christ and the Twelve Apostles' at Copenhagen, are obviously a less spontaneous outcome of his genius. Of his many works those best known by photography and otherwise are the reliefs 'Night' and 'Morning.' Of the many busts from his hand those of Byron, now at Cambridge, and Œhlenschläger are perhaps the most notable.

See the Life of Thorwaldsen (whose name is in Danish spelt Thorvaldsen) by Thiele (3 vols. Leip. 1852-56; Eng. abridgment by Barnard, 1865); Hammerich, *Thorwaldsen und seine Kunst* (Gotha, 1876); Eugène Plon, *Thorwaldsen, sa Vie et ses Œuvres* (Eng. trans. by Mrs Cashel Hoey, 1874); and Sigurd Müller (Copenhagen, 1890 *et seq.*).

Thoth, the Egyptian Hermes or Mercury, the mythical inventor of the arts and sciences, music and astronomy, and especially of speech and hieroglyphs or letters, over which he was supposed to preside. See EGYPT, Vol. IV. p. 235.

Thou (Lat. *Thuanus*), JACQUES-AUGUSTE DE, the most famous historian of his time, was born at Paris in 1553. His father and grandfather had both been presidents of the parliament of Paris, so that he inherited connections which smoothed his own way to fame and place. After five years spent at the university of Paris he continued his studies at Orleans, and subsequently at Valence under the famous jurist Cujacius. At Valence, also, he formed a friendship, equally honourable to both, with the younger Scaliger. Returning to Paris, he witnessed the massacre of St Bartholomew (1572), of which, though a good Catholic, he afterwards spoke with the severest reprobation. A journey to Italy extended his knowledge and turned his mind still more decidedly to the writing of his great history, the plan of which he had already conceived. He had originally chosen the church as his profession, and actually became one of the canons of Notre Dame in Paris; but at the instance of his friends, though against his own wish, he eventually followed the law. His own merit and his family interest brought him rapid promotion; and at the age of thirty-five he obtained the reversion of the office of president of the parliament of Paris. During the wars of the League De Thou stood fast by Henry III., though he was fully aware of his shortcomings as a king, and took a prominent part in the intricate diplomacy of the time. He stood equally high in the opinion of Henry IV., under whom he acted as keeper of the Royal Library, a post which brought him into contact with the great scholars of the time, the elder Casaubon among others. In affairs of state his most distinguished services were rendered in connection with the Edict of Nantes (1598-99), for which his personal character and the esteem in which he was held by Huguenot and Catholic alike eminently fitted him. He died at Paris in 1617.

The great work of De Thou's life was his stupendous history of his own time (1543-1607), written in Latin, filling four closely-printed folios, and comprising 180 books. The appearance in 1604 of the first eighteen books brought its author a European reputation, and those that followed had equal success. His impartial treatment of heretics, however, did not find favour at Rome; and much to the chagrin of De Thou, who was at heart a pious son of the church, his history was placed on the index of prohibited books. During the 17th and 18th centuries De Thou was ranked with the greatest historians, and he was universally quoted as a master of political wisdom. In England Dr Johnson had serious thoughts of translating him; Pitt paid him a special tribute in the House of Commons; and the best edition of his history was published in London by Samuel Buckley at the expense of Dr Meade, and partly under the superintendence of the historian Carte. His commentaries on his own life and a quantity of Latin verses were De Thou's other contributions to literature.

The following are the chief editions of De Thou's History—11 vols. 8vo, Paris, 1609-14; 4 vols. fol., Frankfort, 1625; French translation, 10 vols. 8vo, Paris, 1740; English edition by Samuel Buckley (7 vols. Lond. 1773). For an account of De Thou's life, see Collinson, *Life of Thuanus* (Lond. 1807; chiefly based on De Thou's own Memoirs); and Philarète Chasles, *Discours sur la Vie et les Ouvrages de J.-A. de Thou* (Paris, 1824). And see Stirling-Maxwell, *Miscellaneous Essays* (1891).

Thought-reading, or MIND-READING, a term which came up in 1881 to designate the act or art of discerning what is passing in another's mind by some direct and unexplained method, depending neither on gesture, facial expression, nor any articulate or other voluntary indication. Thus, if A has hid a penknife in some extremely unlikely

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place, B, it is alleged, may, if a susceptible person, be guided to the place so as to discover the object hid without any assistance from A other than being permitted to hold the back of his (B's) hand on A's forehead. The believing explanation is that thought-force, nervous energy, or the like passes in a perfectly natural but as yet unexplained manner through A's forehead into B's hand, and so to B's mind. The unbelieving theory is that A inevitably, but quite unconsciously, communicates a succession of slight but sufficient muscular indications to B, which B instinctively follows without being aware of them severally. Enthusiasts have sought to include thought-reading in the sphere of spiritualism; see the *Proceedings of the Psychical Research Society*.

Thourout, a town in the Belgian province of West Flanders, 11 miles SW. of Bruges. Of great commercial importance in the middle ages, it now manufactures linens and hats. Pop. 8972.

Thousand Islands. See ST LAWRENCE.

Thrace, a name used by the ancients somewhat vaguely for a large region to the west of the Euxine (Black Sea) so as to include the whole country between the Ister (Danube) and the Ægean, and even part of the Scythian country beyond the Ister. Under the Romans, however, part of this vast region was joined to Macedonia; the country between the Ister and the Hæmus (Balkans) became the province of Mœsia (mod. Bulgaria); so that the province of Thracia was the remaining district between the Hæmus and the Propontis, and from the Nestus River (mod. Karasu) to the Euxine; see the map of the Roman empire, Vol. VIII. Thracia was hilly in surface, Rhodope (q.v.) being the chief mountain-system; the chief river was the Hebrus (Maritza); great part of the area was occupied by forest. Who the ancient Thracians were has been much disputed; their language has perished utterly; but there seems no doubt that they were a branch of the Indo-European stock, and kinsmen, more or less remote, of the Greeks, though they were regarded by the Greeks as barbarians. Thrace never constituted one powerful monarchy, though at times the kings of one or other of the Thracian clans extended his power over great part of the country, so as to be formidable to the Athenian colonists or to the Macedonian monarchs. The accepted Roman suzerainty long remained half independent; but under Vespasian Thrace became a province of the empire, and its people became Romanised so entirely that it seems not improbable the Thracian provincials were the direct ancestors of the Vlachs, speaking Roumanian, who are still numerous south of the Danube. Goths and Huns overran the country; Bulgarians occupied the north; and since the conquest of Constantinople by the Turks the fortunes of Thrace have been largely bound up with those of that city. Latterly the northern part of Thrace has become the province of Eastern Roumelia (see BULGARIA), while the remainder is still an integral part of the Ottoman empire.

Thrale. See PIOZZI.

Thrashing is the separating of the grain or seeds of plants from the straw. The earliest method was doubtless the beating out of the grain from the ears with a stick. An improvement on this was the practice of the ancient Egyptians and Israelites of spreading out the loosened sheaves of grain on a circular piece of hard ground 50 to 100 feet in diameter, and driving oxen backwards and forwards over it, so as to tread the grain out; but, as this damaged part of the grain, it was partially superseded by the thrashing sledge, a heavy frame mounted on three rollers, which was dragged over the heaps of sheaves. Similar methods of thrashing were employed by the Greeks and Romans—the stick, the treading by men or horses, and the thrashing-sledge being found in common use among them. The primitive implement in northern Europe was the stick, and an improved modification of it, the *flail* (two sticks loosely fastened together at one end by stout thongs), has not yet disappeared.

Various attempts were made to supersede the flail by a machine, but with little success, till 1787, when Andrew Meikle, an ingenious Scotch mechanic, produced a thrashing-mill so perfect that even after having run the gauntlet of nearly a century of improvers it is essentially the machine of its original inventor. In Meikle's mill the sheaves are loosened and spread out one by one on the feeding-board, A (fig. 1), with the ears towards the machine; they are then pushed forward till caught between two revolving fluted rollers of cast-iron, B; and as soon as one sheaf disappears between the rollers another is presented to them. Behind the rollers is

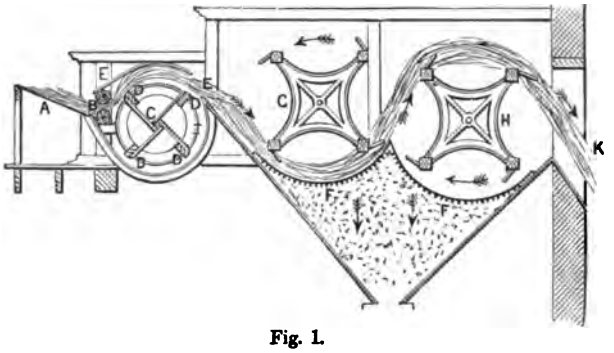

Fig. 1.

a rapidly revolving *drum* or cylinder, C, having four *beaters*, D, D, D, D, or spars of wood armed with iron placed along its surface parallel to its axle; and these beaters, striking the heads as they are protruded from between the rollers, detach the seeds and husks. Grain and straw then pass together over the cylinder, the former falling through the wire-work, F, F, while the straw is carried forward by the circular rakes, G, H, and, being by them thoroughly tossed and separated from the grain and chaff, is ejected at K. The grain which has fallen through the wire-work is received into a winnowing-machine, where it is cleansed from chaff, &c., and then is either discharged upon the barn-floor or, as is the case with the most improved machines, is raised by a series of buckets fixed on an endless web, and again winnowed, to separate the perfect grains from the light and small seeds. Barley is, previous to the second winnowing, subjected to the process of 'hummelling,' by which the awns are removed; but the rest of the process is the same as above.

The earlier alterations upon Meikle's invention were chiefly confined to modifications of the drum; such as diminishing the distance between the drum and its cover, E, E, increasing the number of the beaters, and accelerating the speed of the drum. The speed of the thrashing-machine was next increased, while appliances were attached by means of which at the one operation the grain was thrashed, dressed ready for market, elevated to the granary, and perhaps even sacked, the straw being carried on endless webs to any given part of the straw barn.

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The portable thrashing-machine, now so generally employed in America and England, and to a lesser extent in Scotland, has not the two grooved rollers, the loosened sheaf being at once submitted to the action of the thrashing-machinery; the drum, which is a *high-speed drum*, is provided with six or eight beaters, and its cover is capable of being set at any required distance from it by means of screws.

The attention of inventors and manufacturers of thrashing-machines has been turned of late not only to the question of securing increased speed and more finished work, but also to providing against the risk of accidents to those employed about the mills. The feeding of those high-speed drums which were getting so common was attended with considerable danger, and to prevent this safety-drums of different patterns have been introduced by the various makers. The best of these are so effective that accidents in feeding now rarely occur. Some of the modern machines thrash from 12 to 16 or even more quarters of oats per hour. From 6 to 8 quarters per hour are common quantities even for comparatively small machines.

The driving-power is wind, water, horse-power, or steam; but the first is so very uncertain and unequal in its operation that it has nowadays been mostly superseded by the others. Water-power is always desirable, and when it can be had in sufficient quantity or regularly it is much to be preferred in point of economy, its mode of application to thrashing being either by the ordinary Water-power (q.v.) or by Barker's Mill (q.v.). Horse-power was the agent in most common use in the earlier days of thrashing-mills, the horses being yoked to beams attached to a vertical revolving shaft which communicated motion by means of bevelled gear to the thrashing-machine. But it was found that this kind of work was very trying for the horses, and interfered considerably with the other work of the farm; and accordingly steam-power, as being more economical, has extensively superseded horse-labour, engines of 4 to 10

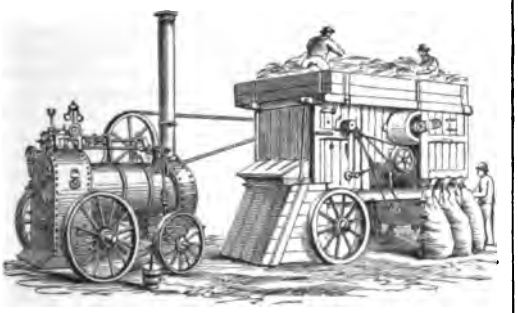

Fig. 2.

horse-power being generally employed. Portable thrashing mills and engines (fig. 2) are thought by many to be more economical, from their saving the labour of transporting the crop from the stack to the barn, and from their adaptability to the requirements of a farmer who may rent more than one holding in a district. On the other hand, however, some prefer the fixed machine on account of cheapness and diminished liability to derangement. Hand-power thrashing-machines are made for use on small holdings. They are hard to drive, but do their work admirably.

Thrasimene. See TRASIMENE.

Thrasybulus, Athenian general and statesman, fought in many campaigns at home and abroad, and was a strenuous supporter of the democracy. In 411 B.C. he helped to overthrow the oligarchy of the Four Hundred, and was banished by the Thirty Tyrants, but restored the democracy in 403. He conquered Lesbos, and defended Rhodes, but was slain in 389.

Thread-cells, another name for Stinging-cells (q.v.), given on account of the coiled thread or lasso that springs out and stings.

Thread-manufacture. Any fibrous substance, such as cotton or flax, when it is to be woven, is first spun into yarn, which is sometimes called thread. Sewing-thread, however, always consists of at least two or more yarns twisted together. In the spinning of yarn the process is the same whether it is to be woven into cloth or twisted into thread (see SPINNING). Beginning with the spun yarn, the stages in the process of manufacturing a six-cord cotton thread (a very common kind) are: (1) The yarn is doubled and wound upon bobbins; (2) the double yarn is then twisted into a two-ply thread; (3) the thread is next rewound on bobbins for the second twist; (4) the thread is twisted a second time on the twisting-frame, three two-ply threads being thus formed into a six-cord thread; (5) the thread is rewound on large bobbins, from which it is reeled into hanks for bleaching or dyeing; (6) the bleached or dyed thread is next rewound on bobbins for spooling; (7) spooling—i.e. winding the thread on small bobbins called spools or pirns for use. The spindles of the spooling-machine run at a speed of 7000 revolutions per minute. See also BOBBIN.

Cotton thread is made at Manchester and in its neighbourhood, as well as at Glasgow. Paisley is, however, the principal seat of the manufacture in Great Britain. The making of thread on an industrial scale was begun in that town in 1722 by Christian Shaw of Bargarran. She had obtained information from Holland about the process of making linen thread, and what she and her friends manufactured was sold at the time under the name of 'Balgarran thread.' The industry did not become of great importance so long as flax was the material used. But in the early part of the 19th century, when the spinning-machines of Hargreaves, Arkwright, and others came largely into use, the manufacture of cotton thread was begun in Paisley, and its progress has been on the whole rapid. This has been especially the case since 1860 through the constantly increasing use of sewing-machines for both domestic and factory purposes. From 10,000 to 12,000 hands were in 1892 employed at the Paisley thread-mills. The mills of Messrs J. & P. Coats, Limited, are spread over 40 acres of ground, and give employment to fully 5000 persons; and this firm has also established works at Pawtucket in the United States, and at St Petersburg. Next in importance are the works of the Messrs Clark. In the United States thread is made in more than one of the north-eastern states.

Linen thread is made at Johnstone near Paisley, Belfast, Nottingham, and other places. Although a much less quantity of it is manufactured, it is perhaps used for a greater variety of purposes than cotton thread. Fine kinds are required for lace-making, and strong kinds for sewing heavy fabrics, as well as for shoemakers', saddlers', and book-binders' use. Silk thread, the stronger kinds of which are called twist, is now used to a very large extent for sewing dyed articles of dress.

Threadneedle Street, in the City of London, got its name from the Merchant Taylors' Company, whose present hall is built on an estate acquired by them as early as 1331. It leads from Bishopsgate Street to the Bank of England, which hence is often called the 'Old Lady in Threadneedle Street.'

Thread-worms, a popular name for Nematoda, a class of more or less thread-like worms,

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many of which are parasitic, while others are free-living. The body is unsegmented; there is a well-developed cuticle; there is a complete alimentary canal surrounded anteriorly by a nerve-ring from which six nerves run forward and backward. The sexes are separate, and the life-history is often intricate. Several species are often parasitic in man—*Ascaris lumbricoides*, in the small intestine; *Oxyuris vermicularis*, in the cæcum and large intestine; *Dochmius duodenalis*, in the small intestine; *Filaria sanguinia hominis*, in the blood; *Dracunculus medinensis*, the Guinea-worm; *Trichina spiralis*; *Trichocephalus dispar*, in the cæcum and large intestine. Not a few are parasitic on plants—e.g. several species of Tylenchus, which infest wheat and other crops. Some occur in domesticated animals—e.g. *Strongylus armatris*, the palisade worm, which causes aneurism in the horse, or *Filaria immitis* in the heart of the dog, or Ollulanus, which passes from mouse to cat. Others live freely in water and putrefying substances—e.g. Euoplius and many other genera.

See ASCARIS, GUINEA-WORM, PARASITISM, TRICHINA; Leuckart, *Parasites of Man* (1876; Eng. trans. 1886); Schneider, *Monographie der Nematoden* (1876).

Threats, considered legally, are intimidation by moral terrorism. Their purpose is to make the person threatened surrender some right, or pay money, or do something to his detriment from fear of a greater evil. The usual form of the crime is sending anonymously or otherwise a threatening letter demanding money or valuable property, under the menace that the victim will be murdered, or his house or property will be destroyed, or his cattle killed or wounded, or that he will be charged with some infamous crime. (The offence is committed though a guilty person be threatened.) To procure the execution of a deed by threats, or to threaten to publish a libel, are varieties of the same offence. In their extreme form such acts are punished with penal servitude for life.

Three Kings, FEAST OF THE, a famous mediæval festival, identical with Epiphany or Twelfth Night. For the kings, see MAGI.

Three Rivers (*Trois Rivières*), capital of St Maurice county, Quebec, at the confluence of the St Maurice and St Lawrence, 95 miles by rail NE. of Montreal. It has a large trade in lumber, over $1,000,000 being invested in mills and booms where logs are accumulated on the St Maurice; and it manufactures boots and shoes, and great numbers of car-wheels and stoves from the bog-iron ore of the vicinity. Three Rivers was founded by Champlain in 1634; a severe battle fought here on 16th June 1776 proved disastrous to the Americans. The city is noted for its Roman Catholic institutions, and is the seat of a bishop. Pop. 9296.—THREE RIVERS, Michigan, on the St Joseph River, 128 miles by rail E. of Chicago, has some manufactures and valuable mineral springs. Pop. 3122.

Thresher. See FOX SHARK.

Threshing. See THRASHING.

Thrift (*Armeria*), a genus of plants of the natural order Plumbagineæ, having the flowers collected into a rounded head, a funnel-shaped, dry, and membranous calyx, five petals united at the base, and narrow, often grass-like, leaves. Two species are included in the British flora, but one of them (*A. plantaginea*) is only found wild in Jersey. The other (*A. vulgaris*) grows in turf-like tufts, with linear leaves, scapes a few inches high, and beautiful rose-coloured, purple, or white flowers, an ornament of the seacoasts of Britain and of Europe generally, and also frequently found on high mountains. Under the names of thrift or sea-pink it is often planted in gardens as an edging, for which it is very suitable, being of a fresh green all the year, and exhibiting its fine flowers in profusion in July and August; but it requires to be renewed every two or three years, the smallest rootless sets growing, however, with great readiness in the moist weather of spring. The flowers are an active diuretic.

Common Thrift (*Armeria vulgaris*).

Thring, EDWARD, a great educationist, was born at Alford Rectory in Somersetshire, November 29, 1821, and had his education at Eton and King's College, Cambridge, of which he was elected fellow. He took orders, and served in curacies at Gloucester and elsewhere, but in September 1853 found the work of his life in the appointment to be head-master of Uppingham school. He found it insignificant, but made it one of the healthiest and best equipped among the public schools of England. He finally limited the number of boys to 330, thirty to each boarding-house, and he gave himself for thirty-four years with restless energy to the task of educating these in the highest sense of the word. No man ever estimated more highly the worth of life: no schoolmaster since Arnold has been more successful in imprinting upon the characters of his pupils a high ideal of duty as the great end of life. The manly fibre of his own nature, his earnestness and honesty, his firm discipline, and his stern denunciation of cowardice and wrong gave a distinctive character to the school. He died October 22, 1887. His works include volumes of school songs and lyrics, an English grammar, a Latin gradual and a construing book; *Thoughts on Life Science*, anonymously (1869), *The Theory and Practice of Teaching* (1883), Uppingham *Sermons* (2 vols. 1886), *Addresses* (1887), *Poems and Translations* (1887), and *Uppingham School Songs and Borth Lyrics* (1887)—Borth was the Cardiganshire village to which the school removed on the outbreak of scarlet fever in 1874.

See J. H. Skrine, *A Memory of Edward Thring* (1889); and H. D. Rawnsley, *Edward Thring, Teacher and Poet* (1889); the Biography was entrusted to Prof. Parkin.

Thrips. See CORN INSECTS.

Throat, AFFECTIONS OF THE. The term throat is applied somewhat loosely to the back of the mouth and front of the neck; its diseases may therefore be taken to include those of the Larynx (q.v.) and upper part of the trachea, of the upper part of the œsophagus, and of the thyroid gland (see GOITRE). Sore throat, however, as commonly used, refers to inflamed and painful conditions of the tonsils and neighbouring parts (see under PALATE), which are numerous. One of the most important (Quinsy, q.v.) has already been discussed; and those attending diphtheria, measles, scarlet fever, syphilis, and other infectious and contagious diseases are sufficiently referred to under their several headings. Sore throat may also be a result of the gouty or rheumatic diathesis, or of the action of certain

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drugs (especially belladonna and iodide of potassium). See also THRUSH, MUMPS, &c. A few other conditions remain to be considered here.

The disease popularly known as *Clergyman's Sore Throat* first shows itself by huskiness of the voice, with more or less coughing, hacking, and expectorating, from an uneasy sensation in the throat; there is, moreover, a constant inclination to swallow. On examining the back of the throat, its mucous membrane is seen covered with elevations, caused by an accumulation of secretion in the follicles, which sometimes burst and discharge their contents, which are of an elastic consistent nature. This discharge is occasionally followed by ulceration. The disease commonly arises from too prolonged or powerful exercise of the voice by persons in whom the mucous membrane of the throat is in a relaxed condition. Perfect rest from public speaking, preaching, acting, &c. is of more importance than anything else in the way of treatment, and a residence during the winter and spring in a mild and equable climate is expedient. Tonics, such as iron, quinia, and strychnia, should be tried, but local applications are usually of far more service than internal remedies. The most important of these are strong caustics, carefully applied by the surgeon to the affected spots: solid nitrate of silver, 'London paste' (equal parts of caustic soda and unslaked lime), and the galvano-cautery are among the means chiefly employed.

Simple or *catarrhal sore throat* is usually a slight affection, most common in young persons, and often resulting from cold. The throat is reddened, but little swollen. A day or two in the house is usually sufficient to effect its disappearance; the sucking of astringent lozenges (e.g. tannin or red gum) or chlorate of potash pellets is also useful. In its chronic form (*relaxed sore throat*) it is more troublesome, but will generally yield to continued use of astringent lozenges, or the application, twice a day with a brush, of glycerine of tannic acid, or solution of perchloride of iron (one drachm to the ounce of water), if attention be at the same time paid to the general health.

Ulcerated sore throat is generally the result of unhealthy conditions acting on persons in a weakly state. It is particularly common in nurses and students occupied in hospital work, and is generally speedily recovered from when the patient is placed in healthy surroundings and put upon tonic treatment. The white spots seen on the tonsils in *follicular tonsillitis*, a more common and slighter affection, are often mistaken for ulcers, but they really consist of excessive and thickened secretion from the recesses of the tonsil.

Cutting the throat is comparatively seldom the result of accident; it is more often due to a murderous attack, and most frequently to an attempt at suicide. The first duty of the surgeon in treating a case of cut throat is to arrest the flow of blood. Ligatures should be applied to wounded arteries, and steady pressure with the finger (beneath which a small pad of lint is placed) to wounded veins, such as the external jugular. If the internal jugular is wounded, fatal hæmorrhage will very rapidly ensue, unless the wound is immediately plugged with small pieces of sponge, or pressure with the finger is maintained as long as necessary. With a knowledge of these means of checking hæmorrhage by pressure, an intelligent non-professional person may be the means of saving life. When the bleeding has completely ceased, but not till then, means may be taken for bringing together the edges of the wound. When the air-passages are wounded there is great risk of the occurrence of bronchitis or pneumonia, and the patient must be kept in a warm room, and care taken to prevent either food or discharges from the wound from passing down the windpipe. See Sir M. Mackenzie's *Diseases of Throat and Nose*.

Throgmorton, SIR NICHOLAS (1513–71), distinguished himself at the battle of Pinkie, was Queen Elizabeth's ambassador in France, where he was imprisoned as having sided with the Huguenots, and was repeatedly ambassador to Scotland in the troublous period 1561–67. In 1569 he was sent to the Tower for a time as being concerned in the scheme for marrying Mary Queen of Scots to the Duke of Norfolk.

Thrombosis (Gr. *thrombos*, 'a clot of blood'), an affection of the blood-vessels (either veins or arteries), which essentially consists in a coagulation of blood (forming a true clot) at a certain fixed spot. Under certain morbid conditions the blood has a tendency to coagulate in its vessels during life on the least provocation. Thus, slight pressure on the side of a vein will sometimes induce this coagulation, while in other cases it is due to inflammation of the tissues which surround a vein, or laceration of a vein (as when the placenta is expelled from the uterus). A clot thus formed in a vessel may increase and extend from one to another, till it reaches and finally fills a large vessel.

Throndhjem. See TRONDHJEM.

Thrush (*Turdus*), a genus of Passerine birds of the family Turdidæ. The bill is of moderate size and slightly convex; the gape is furnished with hairs; the nostrils lie at the base of the bill, partly covered by a membrane; the first wing-feather is very short; and the outer and middle toes are connected at the base. The genus includes numerous species widely distributed throughout temperate

Missel Thrush (*Turdus viscivorus*).

and even cold regions. The largest known British species is the Missel Thrush (*T. viscivorus*), sometimes called the 'storm-cock' from its habit of singing before or during wind or rain. It breeds freely throughout the British Islands, but migrates from the colder regions on the approach of winter. It breeds early in the year; its nest is usually in the fork of a tree, and neatly lined with grasses and moss. The adult male measures about 11 inches; the prevailing colour of the upper parts is grayish brown, under parts brownish white, with dark spots.

The Song Thrush or Mavis (*T. musicus*) also occurs in almost all parts of Britain. It resembles the missel thrush in general appearance, but is smaller in size, of a more olive-brown colour, and possesses finer powers of song. The nest of the song thrush is usually composed of roots and grasses, lined with a thin coating of mud, decayed wood, or dung. The eggs are of a greenish-blue colour, with black or brown markings, and in the warmer parts of the country two broods are reared in a season. The food of the

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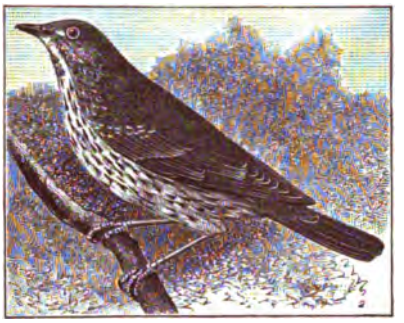
song thrush consists of berries, insects, worms, and small molluscs, the shells of the last being broken by repeated knocking against a stone. Other species either resident in Britain or visiting it for a part of the year are the Blackbird (*T.*



Song Thrush (*Turdus musicus*).

merula), the Fieldfare (*T. pilaris*), the Redwing (*T. iliacus*), and the Ring-ouzel (*T. torquatus*), all of which are described in separate articles. The genus Turdus is represented in North America by the Wood Thrush (*T. mustelinus*) and several other species. The flesh of all the thrushes is esteemed a delicacy, and they are snared in enormous numbers while they are assembling for their winter migration.

Thrush, known also as *Infantile Sore Mouth*, is commonly a disease of early infancy, although it may occur at any age. Its characteristic symptom is the presence of small roundish white specks or patches (Aphthæ, q.v.) on the lining membrane of the cavity of the mouth and throat, on the surface of the tongue, the angles of the lips, &c. In thrush crops of these little patches commonly succeed one another. They render the mouth hot and tender, in consequence of which the act of sucking is accompanied by difficulty and pain. In association with these local symptoms are indications of general constitutional disturbance, such as feverishness, drowsiness, sickness, flatulence, colicky pains, diarrhœa, &c. The complaint sometimes seems to be the result of improper diet, or of imperfect attention to cleanliness of the bottle, &c., if the child is being brought up by hand, or of unwholesome milk from a diseased or intemperate nurse; of bad ventilation, &c.; but in some cases the cause of the disease is not evident. The disorder usually lasts eight or ten days, and is only attended with danger when the local affection runs into a low form of gangrenous ulceration. As a local application to the patches glycerine or honey of borax may be applied with a camel-hair pencil; or a pinch of a mixture of powdered borax and loaf-sugar (1 to 8 or 10) may be placed occasionally on the tongue, and the infant allowed to spread it over the mouth. An occasional dose of gray powder may be required; and in some cases a little brandy, or small doses of quinine and iron.

Thrush, or FRUSH, in the horse, consists in inflammation of the sensitive surfaces within the frog, giving rise to a fetid discharge, constituting unsoundness, and sometimes causing lameness. Want of cleanliness is the chief cause. Daily, when the horse returns to his stable, the foot should be washed out with soap and water, carefully dried, and the fissures filled with mineral tar. If amendment does not speedily ensue, a dressing of calomel should be substituted for the tar several times a week. Ragged or loose portions of the frog may be removed by the knife or scissors.

Thuanus. See THOU, DE.

Thucydides, the great historian of the Peloponnesian war, born in the deme Halimus most probably in 471 B.C., was the son of Olorus and Hegesipyle, and was related to Miltiades and Cimon. It is probable that his literary model was Antiphon, and that he was influenced in his views on philosophy by Anaxagoras. Certain it is that, Athenian as he was, of good family, and resident in the most cultivated community in Greece, he must have known Sophocles, Euripides, Aristophanes, Phidias, Protagoras, Gorgias, and possibly Herodotus and Æschylus. He was further possessed, either by inheritance or by acquisition through marriage, of gold-mines in that part of Thrace lying opposite the island of Thasos. We know from himself that he was one of the sufferers from the terrible plague of Athens, and also one of the few who recovered. He held military command, and he had under him an Athenian squadron of seven ships at Thasos, 424 B.C., when he failed to relieve Amphipolis, which fell into the hands of Brasidas. Condemned to death as a traitor, he took refuge in exile and retired to his Thracian estates. His exile enabled him, as he tells us, to associate with the Peloponnesians quite as much as with the Athenians; and he probably spent some time also in Sicily, as we may infer from his minute descriptions of Syracuse and its neighbourhood. According to his own account, he lived in exile twenty years, and probably returned to Athens after the destruction of its walls, in 404. How or when he died is unknown; but he did not live long enough to revise book viii. or to bring his history down to the end of the war.

If Herodotus was 'the father of history,' Thucydides was the first of critical historians, and no better account of his methods can be given than is contained in his own words: 'Of the events of the war I have not ventured to speak from any chance information, nor according to any notion of my own; I have described nothing but what I either saw myself or learned from others, of whom I made the most careful and particular inquiry. The task was a laborious one, because eye-witnesses of the same occurrences gave different accounts of them, as they remembered or were interested in the actions of one side or the other' (i. 22). There is hardly a literary production of which posterity has entertained a more uniformly favourable estimate than the history of Thucydides. This high distinction he owes to his undeviating fidelity and impartiality as a narrator; to the masterly concentration of his work, in which he is content to give in a few simple yet vivid expressions the facts which it must have often taken him weeks or even months to collect, sift, and decide upon; to the sagacity of his political and moral observations, in which he shows the keenest insight into the springs of human action and the mental nature of man; and to the unrivalled descriptive power exemplified in his account of the plague of Athens, and of the Athenian expedition to Sicily. Often, indeed, does the modern student of Greek history share the wish of Grote, that the great writer had been a little more communicative on collateral topics, and that some of his sentences had been expanded into paragraphs, and some of his paragraphs into chapters. But this want cannot have been felt by the contemporaries of Thucydides, while the fate of other ancient historians warns us that had his work, like theirs, been looser in texture, or less severely perfect, it would not have survived, as it has done, the wearing influence of time, or remained, in its own language, the *ktema es aei*—the 'possession for ever'—it has proved to the world.

It has been reserved for the 19th century to impeach the credibility, depreciate the matter, and to condemn the style of Thucydides. As these indictments, however, usually conclude with

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the statement that Thucydides remains nevertheless the greatest of historians, they might here be passed over in silence were it not in the first place that they serve to show that Thucydides' fame is proof against the solvents of modern criticism, and next that they help us to a more complete understanding of the qualities which have given to Thucydides' work such a wonderful hold over the intellects and imaginations of all his readers and all his critics. The attacks on Thucydides' credibility have proceeded from Germany (see Müller Strübung in *Jahrb. f. Phil.* 131, 289 ff., and his *Aristophanes und die historische Kritik*, with Lange's reply in the *Jahrb. f. Phil.* 135, 721–748, and Classen's introduction to Thucydides, v., and Strübung's rejoinder *Thuk. Forschungen*), but have met with little acceptance there, and have found only one English-speaking follower, Professor Mahaffy. The most serious outcome of the discussion seems to be that Thucydides' knowledge of the topography of Platææ was defective, and that his account of the siege is consequently in accordance with the situation rather as he conceived it than as it actually was. But, even if we accept this application of the methods of modern criticism, it must not be imagined that those methods have all the same tendency. On the contrary, the actual treaty which Thucydides quotes in v. 47 has been discovered of late years, and confirms the accuracy and truth of the historian in a most unexpected and startling manner. The exact amount of accuracy or inaccuracy in Thucydides' account of the siege of Platææ is matter of opinion; his accuracy in the matter of the treaty is not—it is beyond dispute. But, after all, it is not by tests such as these, welcome as they are, that we can form an adequate opinion on the credibility of Thucydides. As an Athenian comedian remarks, we do not believe a man because he takes an oath—we trust the oath because we believe in the man. And so we believe in Thucydides not because we have external tests to apply (for we have not enough), but because the universal experience of all who read him is a feeling of conviction that his intention was to speak the truth, as far as he could ascertain it. This conviction is ultimately due to the fact that in the man's work we are brought directly into touch with the man, and we judge his character as we judge that of any acquaintance whom we know in the flesh. No man can devote himself for twenty-seven years to composing a work without putting a good deal of himself into the work, or without writing his character down in it—unconsciously but none the less legibly. What then are the qualities of character which impress the reader of Thucydides? In the first place, his impartiality. This is a quality unknown to Latin historians for instance. Tacitus will not admit that the Romans were ever defeated—the result was, at most, indecisive—even though the subsequent movements of the troops, as described by himself, clearly show that the Romans lost. Thucydides, on the other hand, though an Athenian, never extenuates even the mistakes of the Athenians; and though himself banished by them, sets down naught in malice against them. Next, the reader feels that Thucydides strove—and that always—to ascertain facts, and to put down as facts nothing but facts. This conviction is forced on one in many ways, some of which are palpable enough to admit of being clearly indicated. To begin with, there is the fact that, when in search of a subject, Thucydides did not, like all other historians before him, choose a period of ancient history, which, being ancient, must be based on vague hearsay or dim tradition. He preferred contemporary history and events which he himself witnessed in part, while he could obtain the evidence of eye-witnesses for the remainder. Nor did he wait until the conclusion of the war before setting about his task; from the very beginning he began collecting his facts. Next, his history is not designed to prove or illustrate any theory. He himself, in the passage quoted above, disclaims all attempt to adapt facts 'to any notion of his own;' and it is evident that beginning to write, as he began, at the commencement of the war, when its course and its issue were yet in the future, he could not have designed to bring its history into conformity with any pre-conceived or *a priori* theory. Herodotus, writing the history of the past, was in a position to trace the finger of destiny in what had happened, and to explain history by means of final causes. But Thucydides, when he undertook to record the present, thereby deliberately elected to confine himself to efficient causes. This preference for efficient causes and for 'scientific' history, in the best sense of the term, is intimately connected with the 'positive' nature of his history—that is to say, with his perpetual endeavour to record facts and to distinguish them from inferences drawn from facts. A clear consciousness of this difference is involved in one of the most characteristic features of his history—that is, the marked difference between his narrative and the speeches which he introduced into it. The former contains facts and facts only, facts stated with a precision and objectivity which—e.g. in his description of the symptoms of fever in sufferers from the great plague—have been the marvel of all subsequent generations, and the greatest marvel to those who by special professional knowledge are competent to judge. The speeches, on the other hand, are not what the speakers actually said—but of this Thucydides warns the reader at the beginning, showing clearly at once the distinction he drew between facts and inference, and his anxiety that the reader should realise the distinction. In fine, most of the untruth in this world is due not to deliberate perversion, but to the simple fact that so many people are quite unconscious what truth is. When then we find that Thucydides had a conception of historic truth and fact such as 2000 subsequent years have been unable to improve, and that he strove strenuously all his life to live up to that conception and write up to it, we can well understand that even 19th-century criticism acknowledges itself incapable of shaking his credibility.

As for the subject of Thucydides' history, if the Peloponnesian war was not a matter of importance in universal history, it was at least not Thucydides' fault that he was not contemporary with some more important war. But we may beg leave to doubt whether the Peloponnesian war was of inferior interest for the fortunes of mankind. Had it not been for the exhaustion it induced, Greece would not have succumbed to the Macedonian, and consequently Alexander's conquests would never have spread Greek culture over the ancient world. But, apart from this, Thucydides' history is the history of the effects of empire on an imperial state; and, as such, will always be of enthralling interest to citizens of sovereign communities. Finally, Thucydides' style, criticised by Dionysius and condemned by Mure, is (in the speeches) difficult beyond all possibility of dispute. To throw the blame of this obscurity on the unformed condition of Attic Greek at the time when Thucydides wrote is warrantable indeed, but is no adequate defence. To point, on the other hand, to the tract *On the Athenian Polity* as proof that Attic prose could be translucent in Thucydides' time is beside the point, for Attic, as is well known, could only be written well by those who lived continuously in Athens, and Thucydides was exiled for many

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a year. But, in truth, the question whether it is Thucydides or the literary age in which he lived that is to be blamed for his obscurity is a wholly irrelevant question. Obscurity, whatever be its cause, is a crime in a writer. But it is a crime which carries its own punishment, for it diminishes the number of an author's readers. The exact amount of criminality is not to be determined on any abstract principles or by the exercise of any mysterious 'taste:' it admits of one simple practical test—viz. has the obscurity of his style (in so far as it exists), as a matter of fact, prevented him from attaining fame? In the case of Thucydides it has had no such effect, as all testify. People will not read a difficult author if there is an easier one out of whom they can get as much. That Thucydides has, in spite of his difficulty, always been read is in itself sufficient testimony that there is no other historian to rank with him.

The best editions are in Latin that of Poppo (11 vols. Leip. 1821-40), in German that of Classen (2d ed., 8 vols. Berlin, 1870-78), and in English—at least for historical illustration—of Arnold (3 vols. Oxford, 1830-35). The best English translation is by Professor Jowett (with a commentary, 2 vols. Clarendon Press, 1881); that by the Rev. Thomas Dale is also good (2 vols. 1848), as is that of the speeches by H. M. Wilkins (2d ed. 1873).

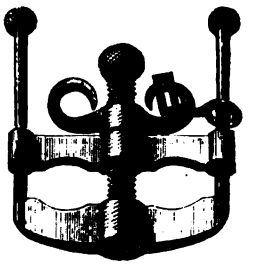
Thugs (from the Hindustani *thaga*, 'deceive'), the name for a religious fraternity in India, which, professedly in honour of the goddess Káli, the wife of Siva, was addicted to the committal of murders, and lived upon the plunder obtained from its victims. Banding together in gangs, they assumed the appearance of ordinary traders, and, insinuating themselves into the confidence of unsuspecting fellow-travellers, killed them by strangling (whence they were often called *phansigars*, 'stranglers'), or by poisoning with datura (see THORN-APPLE). They were bound together by bloody oaths, and carried on systematic assassination on a large scale. They considered their murders pious rites, and their profession more than respectable. The confraternity appears to have come into existence under the early Mohammedan rulers of India; and though the English government frequently apprehended Thugs, it was reserved for Lord William Bentinck, assisted by Captain Sleeman, to adopt such vigorous measures as practically extirpated thuggee (*thagi*). In 1826–35 no fewer than 1562 Thugs were apprehended—mainly by help of accomplices turning informers—of whom 382 were hanged, and most of the rest transported or imprisoned for life. Thuggee by poisoning was still carried on long after strangling was a thing of the past.

See Col. Meadows-Taylor's graphic tale, *Confessions of a Thug* (1839; new ed. 1879); Capt. Sleeman's *Report* (1840); Hutton's *Thugs and Dacoits* (1857); for thuggee in 1867, Hervey's *Some Records of Crime* (1892); and for their jargon, Sleeman's *Ramaseeana* (1836) and Yule and Burnell's *Hobson-Jobson* (1886).

Thuja. See ARBOR VITÆ.

Thule, the name generally given by the ancients to the most northerly part of Europe known to them, of which their want of knowledge was eked out by the imagination. According to Pliny it was an island in the northern ocean, discovered by the navigator Pytheas of Massilia, who reached it after six days' sail from the Orcades. Most probably Pytheas followed closely the eastern coast of Great Britain, and heard exaggerated reports of the groups of islands farther north—the Orkney and Shetland groups, or even Iceland, though this is hardly probable. These he thought lay close to the Arctic Circle. The usual Roman phrase was *Ultima Thule*.

Thumbscrew, or THUMBIKINS, an instrument of torture for compressing the thumb, largely made use of by the Inquisition in Spain, and also occasionally used in England, when examination by torture was practised there. It was much in use during the brutal persecutions of the Covenanters in Scotland, and the famous Carstares (q.v.) was tortured thus for an hour and a half at Holyrood to obtain the secrets of the Argyll party.



Thumbscrew.
(In Ant. Mus., Edinburgh.)

Thun, a picturesque and ancient town of Switzerland, 17 miles SSE. of Bern by rail. It stands on the Aar, hardly a mile from the Lake of Thun (12 miles long, 2 broad; greatest depth, 1844 feet), out of which the river rushes past the town in a stream of crystal clearness. A 12th-century castle and a venerable church are the chief buildings. Pop. 5507.

Thunder. See LIGHTNING. Celts (see STONE AGE) are sometimes called thunderbolts, from a notion that they are meteoric stones; and for a like reason Belemnites (q.v.) are called thunder stones. For the Thundering Legion, see AURELIUS.

Thunder Bay. See SUPERIOR (LAKE).

Thurgau (Fr. *Thurgovie*), a frontier canton in the north-east of Switzerland. Area, 381 sq. m.; pop. (1888) 105,091, of whom two-thirds are Protestants. The surface, unlike that of the other cantons of the country, is undulating or hilly, but nowhere mountainous, the chief height being the Hörnli in the extreme south, 3722 feet. The principal river is the Thur, which, flowing WNW. through a broad fertile valley, joins the Rhine in the canton of Zurich. Capital, Frauenfeld.

Thurifer (Lat. *thus*, 'incense,' and *fer-*, 'to carry'), the attendant in the Roman Catholic Church, at solemn mass, vespers, &c., whose duty it is to carry the *thurible*, or incense-vessel, and either to minister incense himself or to present the thurible to the officiating priest. The office is one of those which belong to the so-called 'minor order' of *Acolyte*.

Thuringia (Ger. *Thüringen*), the name still borne by that part of the ancient Saxon area which is generally bounded by the Werra, the Saale, and the Harz Mountains; the Thuringian states being the minor Saxon Duchies (q.v.), the two Schwarzburgs, the two Reuss principalities, and small parts of Prussia, Saxony, and Bavaria. The district got its name from the Thuringian tribe of Germans, who were found inhabiting it in the 5th century. The Thuringian Forest (*Thüringer Wald*) is a series of wooded mountain-ridges occupying great part of this area. It is some 70 miles long, and belongs to the Sudetic system.

Thurles, a town in county Tipperary, Ireland, situated on the river Suir, 87 miles SW. of Dublin by rail. Four miles distant is the beautiful 14th-century ruin of Holy Cross Abbey. Thurles has a (classical) Roman Catholic cathedral, built at a cost of £45,000, the seat of the archbishopric of Cashel. Pop. 4850.

Thurlow, EDWARD, BARON, was born a clergyman's son in 1732, at Bracon-Ash in Norfolk. He was sent to Canterbury grammar-school, whence he passed to Caius College, Cambridge. Here he was as insolent and insubordinate as at school, and was sent down in 1751 without a degree. He at once entered at the Inner Temple, and was called to the bar in 1754. He was a

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fellow-pupil in a solicitor's office with the poet Cowper, and still affected idleness, although in reality he worked hard to make himself a good lawyer. His lofty stature, strongly marked features, dark eyes, bushy eyebrows, and look of self-possession led every one with whom he came in contact to attribute to him qualifications he really did not possess—'no man,' said Fox, 'ever was so wise as Thurlow looked.' An accidental meeting at a coffee-house with the Scotch solicitors in the great Douglas case led to his employment in it as junior counsel, and to his acquaintance with the members of the Douglas family. One of them, the Duchess of Queensberry, by her influence with Lord Bute obtained for him in 1761 the rank of King's Counsel. Soon after this he acquired a still higher reputation by his speech in the Douglas Peerage case—the greatest effort of his life. In 1768 he was returned for Tamworth, and became a zealous supporter of Lord North; in March 1770 he was made Solicitor-general, and the year after Attorney-general. He gained the special favour of George III. by the violent zeal he displayed in supporting his American policy. In 1778 he became Lord Chancellor and Baron Thurlow, and such was his influence with the king that he was allowed contrary to all precedent to retain the office under the Rockingham administration. He caused great embarrassment by opposing all the measures brought in by that government. Under the coalition ministry of Fox and North he was compelled to retire, but continued a vigorous opposition, and was restored as Chancellor on Pitt's accession to power. For a time he supported the government; but, relying again on the support of the king, he once more began, first secretly, then openly, to undermine the power of his colleagues. Pitt then intimated that he or Thurlow must retire, and the king, without any hesitation, consented to his removal (1792). Thurlow at once sank into obscurity. He amused himself in reading the Latin and Greek classics with his nephews, and spent much of his time in visiting and receiving visits. He died at Brighton, September 12, 1806. Thurlow was vulgar and arrogant, his profanity and immoralities notorious. Lord Campbell says he can find nothing recorded of him to justify the great reputation for ability he had among his contemporaries, and ascribes it chiefly to his assuming manner; but it should be remembered that he had no Boswell to record his talk, and that it was this that was most admired. It was of no ordinary man that Johnson said, 'I would prepare myself for no man in England but Lord Thurlow. When I am to meet him, I should wish to know a day before.'

Thurn and Taxis, PRINCES OF, a princely house with high rank, hereditary dignities, and vast possessions in Austria, Bavaria, Würtemberg, Prussia, and Belgium, the heads of the two main lines being resident at Ratisbon and at Laucin in Bohemia. Descended from the Della Torre of Milan (whence the first part of their name), with a castle of Tasso or De Tassis (whence the second), members of this house have been distinguished in connection with posts. One established posts in Tyrol in 1460; another, ennobled in 1512, established the first post between Vienna and Brussels in 1576. His descendant became in 1595 grand-master of the posts of the Holy Roman empire, and secured the right of carrying on the posts of the empire which extended from Hamburg to Rome, and from Paris to Vienna, for himself and his heirs as a hereditary privilege. In 1681 the principality of Thurn and Taxis in the Netherlands was conferred on the head of the house; and in 1698 the princely rank and title were made hereditary, and passed to all members of the house. The postal privileges were gradually limited by the governments of the various countries; but it was not till 1867 that Prussia secured by treaty with the family the abolition of the monopoly.

Thurot, FRANÇOIS, was born at Nuits in Côte d'Or, son of a petty innkeeper, 22d July 1726. He grew up a reckless and violent lad, and served on a privateer, but was captured and kept a year in Dover prison. He managed to seize a small boat, and crossed the Channel with a pair of sculls and his shirt as a sail. The Maréchal de Belle-Isle hearing of the exploit enabled him to study navigation, and Thurot, again joining a privateer, rose so rapidly that by 1748 he was able to fit out a merchant-ship. He next spent a few years in England, mostly in London, betwixt music, mathematics, and dissipation, varied by smuggling and perhaps piracy; and in 1753 his ship was seized by the English. The outbreak of war recalled him to France. He was given the command of a squadron of two frigates and two sloops, with which he scoured the Channel, cruised along the east coast of England and Scotland, frightening terribly the townspeople of Banff (5th October 1757), and fought a brisk action with two English frigates at the mouth of the Forth. In October 1759 he again weighed from Dunkirk with a squadron consisting of four frigates, with 1200 soldiers under command of Flobert, and made his way to Lough Foyle, intending a descent on Londonderry. High gales made it impossible to enter, whereupon he crossed to Islay for supplies, and then sailed for Belfast Lough, intending to make a dash on Belfast. Flobert ruined the plan by insisting on attacking and taking Carrickfergus first (21st February 1760), but refused to move on Belfast. The delay had given time for three English frigates of Hawke's fleet to come up; and Thurot fought an hour and a half, till he was struck down, on which his ship hauled down her colours. See Prof. J. K. Laughton's *Studies in Naval History* (1887).

Thursday Island, one of the smallest of the group of the Torres Straits islands, north of Cape York, and belonging to Queensland. It has an excellent harbour, Port Kennedy, which is a telegraph station, and a station for several lines of steamers. The island is a centre of the pearl and trepang fisheries.

Thurso, a burgh of barony and seaport of Caithness, at the mouth of the Thurso River, by rail (1874) 21 miles NW. of Wick and 154 NNE. of Inverness. It is pleasantly situated and handsomely built—except in the older quarter—and has six churches, a town-hall (1870), capital bathing, &c. The harbour at the mouth of the river had got silted up; but extensive improvements were carried out in 1891–92, when also a good pier at Scrabster was extended, on the west side of the bay, where steamers regularly call. The rock scenery around the town is very fine. Paving-stones are prepared and exported, and live-stock and grain shipped. The self-taught geologist, Robert Dick (1811–66), was a baker here from 1830. Pop. 3930.

Thyatira. See AK-HISSAR.

Thylacine (*Thylacinus*), the largest of the extant predaceous marsupials, represented by one species (*T. cynocephalus*), now restricted to Tasmania, and in process of extermination at the hands of the sheep-farmers, whose folds it is wont to ravage. It is somewhat smaller than a wolf, has a dog-like muzzle, a long tapering tail, and is grayish brown in colour, with black cross bands on the hind part of the back and loins. It is very active and fierce, and is popularly called a 'tiger,' a 'wolf,' or a 'hyæna.'

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Thyme (*Thymus*), a genus of humble, half-shrubby plants, of the natural order Labiatæ, having a two-lipped calyx and four diverging stamens. Garden Thyme (*T. vulgaris*) is 6 to 10 inches high, with narrow, almost linear leaves, and whitish or reddish flowers, which grow in separate whorls, six in a whorl. It is a native of Spain and Italy, is very commonly cultivated in gardens on account of its fragrance, and was introduced into Britain about 1548, or very probably at an earlier date. Wild Thyme (*T. Serpyllum*) has a procumbent stem with many branches, forming tufts, low and dense, a few inches to a foot wide, oval leaves and purplish flowers, arranged in whorls, which are united in a head. It is abundant on hills and mountains in Britain and in all parts of Europe and the north of Asia. It is less fragrant than garden thyme, but both species contain an aromatic essential oil. The flowering branches (*Herba Thymi* and *Herba Serpylli*) are used in medicine as a powerful stimulant, and those of garden thyme are also used in cookery for flavouring. The Lemon Thyme, or Lemon-scented Thyme, of our gardens, is regarded as a variety of *T. Serpyllum*. It is generally of still lower growth than the common garden thyme. No species of thyme is indigenous in America. Thymol, an antiseptic phenol, is obtained from oil of thyme by distillation.

Thymeleaceæ, a natural order of plants, of which the Mezereon and Spurge Laurel (see DAPHNE) are familiar examples. This order consists chiefly of shrubs, with a few herbaceous plants, and contains about 300 species, natives chiefly of the warmer temperate countries. Poisonous properties prevail in the order. The bark is in general very caustic.

Thymus Gland, a gland which begins to form at an early period of embryonic life, and, commencing as an epithelial ingrowth from the throat, extends from the neck right into the chest, where it is placed anteriorly in the mediastinum. It continues to grow after birth, but when adult life is reached it shrivels to an inconsiderable mass. When examined microscopically it is seen to consist of a tissue very similar to that of a lymphatic gland, and in this tissue are (Hassall's corpuscles) nests of concentrically arranged epithelial cells, probably the remnants of that epithelium of which the gland, at an earlier period, was almost entirely composed. The gland when fully developed is what may be called a blood-gland, for it is connected with the rest of the system by blood-vessels and nerves alone, unlike the liver or kidneys, which are provided with ducts through which their secretion is carried away. Regarding the function of this gland almost nothing is known. It probably is concerned, in some way, in altering the chemical or cellular structure of the blood. Numerous extractives, such as leucin and tyrosin, are found normally in it, and from it a substance can be extracted which acts as a powerful blood coagulant. It is possible, too, that in its substance the blood-cells may to some extent be produced. Its early development and rapid disappearance suggest that its chief activity is called into play during that period of life when growth and tissue formation are most active.

Thyroid Gland, a gland which arises in the early human embryo as an ingrowth from the lower part of the pharynx. This extends down to the lower part of the neck, and its original connection with the pharynx is lost. In the adult it is found as a bilobed structure on either side of the windpipe, and joined in front of this tube by an isthmus of gland-tissue. It is ensheathed in connective tissue, which passes into its interior, supporting and separating from one another the delicate structures within. The gland is a ductless gland, but is richly supplied by blood-vessels, which ramify around the tiny glandular capsules of which it is composed. If a section of the gland be examined with the microscope, it is seen that there is a vast number of tiny spherical cavities lined by short cubical cells; and within and entirely filling these cavities, there is a structureless-looking and very insoluble jelly. In the walls of the little cavities the dense Anastomosis (q.v.) of blood-vessels is seen. We are very much in the dark as to the meaning of this structure, and the parts played by the epithelial cells and the jelly in the function of the gland. That the gland is important is proved by the injurious effects which follow its removal, and by the fact that in connection with several diseases the gland is swollen and altered in structure. In some animals, the dog for instance, the jelly within the capsules is often found to contain red blood-corpuscles. Sometimes large numbers of these are seen, and in other cases the blood pigment (hæmoglobin) may be seen beautifully crystallised out in the jelly. That the gland has something to do with the blood seems very evident, but what part it exactly plays is not yet certain. If the gland be excised, in some animals, curious mucous degenerations are found to follow the operation, and a tendency to mucous deposits and tumours seems to be associated with disease of the gland. Some have thought that this points to some action of the gland in the formation of mucous within the body, but about this little is known. If the gland is excised nervous symptoms and muscular tremors may be produced, and it has been supposed that in some way the gland exercises an influence upon the blood-flow through the brain. The gland is frequently enlarged, forming the condition termed Goitre (q.v.). This enlargement may be due to a great increase in the number of blood-vessels, or we may find that it is due to the enlargement of the little capsules which normally contain the thyroid jelly. These capsules run together so as often to form large cysts full of jelly. Associated with this enlargement one often finds nervous symptoms and disturbances of the circulatory system, and the curious condition termed cretinism. In exophthalmic goitre we have a peculiar protrusion of the eyes associated often with an unimportant-looking swelling in the neck. See also CRETINISM, MYXŒDEMA.

Thysanura, an order of wingless insects of small size. They undergo no metamorphosis. The abdomen usually bears peculiar structures, which seem to be abortive limbs, and the name Thysanura or bristle-tails refers to terminal appendages which are sometimes long and hairy. See SPRING-TAILS; and Sir John Lubbock, *Monograph of the Collembola and Thysanura* (Lond. 1873).

Tian-shan ('Celestial Mountains'), a great mountain-system, consisting of several ridges, mostly parallel, in central Asia, extends from the Pamir (q.v.) to the north of the Tarim depression in Turkestan, and occupies the frontier region between Russian territory on the north and the Chinese dominions to the south. See ASIA, Vol. I. p. 486.

Tiara.

Tiara, the triple crown of the pope, which is considered to be symbolical of his temporal, as the keys are of his spiritual authority. It is composed of a high cap of gold cloth, encircled by three coronets, with a mound and cross of gold on the top. The original papal crown consisted of the cap alone, the word *tiara* having long been

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synonymous with *mitra*. It is not certain when the first and second princely crowns were added, the current statement that it was Boniface VIII. who assumed the second having been disproved by Hefele from old representations of Innocent III. Urban V. (1362–70) added the third.

Tibbu, a people of the Sahara (q.v.).

Tiber (Ital. *Tevere*, Lat. *Tiberis*), the chief river of Central Italy, and the most famous in the peninsula, rises in a dell of the Tuscan Apennines (province Arezzo), about 11 miles N. of the village of Pieve Santo Stefano. Its course until it reaches Perugia is south-south-east; thence, as far as Rome, it pursues, along an irregular zigzag line, a southern direction; but when it enters the plain of the Campagna it curves south-south-west, and enters the Mediterranean by two branches, which enclose the Isola Sacra. Of these the northern, the Fiumicino, alone is navigable; the Fiumara is silted up with sand. The entire course of the river is about 260 miles—only 145 direct from source to sea. The most celebrated towns on or near its banks are Perugia, Orvieto, Rome, and Ostia; and its chief affluents are the Nera with the Velino and Teverone or Aniene (*Anio*) from the left, and the Paglia with the Chiana from the right. In its upper course it is rapid and turbid, and of difficult navigation. It is navigable for boats of fifty tons to the confluence of the Nera, 100 miles from its mouth, and small steamers ascend to within 7 miles of that point. The Tiber is supplied mainly by turbid mountain-torrents, whence its liability to sudden overflowings of its banks; even the oldest Roman myth, that of Romulus, being inseparably associated with an inundation. Its waters, too, are still discoloured with yellow mud, as when Virgil described it—*Vorticibus rapidis et multa flavus arena*. See ROME, pp. 784, 786; and W. Davies, *The Pilgrimage of the Tiber* (2d ed. 1875).

Tiberias. See GALILEE.

Tiberius, the second emperor of Rome (14–37 A.D.), whose real character remains to this day among the enigmas of history. Tiberius Claudius Nero was the son of T. Claudius Nero and of Livia, and was born 16th November 42 B.C., four years before her complaisant husband yielded Livia to the triumvir Octavianus. He was nine when his father's death transferred him to the tutelage of his step-father, and eleven when that step-father became the undisputed master of the Roman empire. Being now a member of the imperial household, he received a careful education and the same public honours as were paid to the nephew and grandsons of Augustus. At nineteen he filled the quæstorship, became prætor at twenty-five, and consul at twenty-nine. But almost the whole of his first twenty years of manhood were spent in the camp—in Spain, Armenia, Gaul, Pannonia, and Germany. He had the honour of bringing back the standards lost with Crassus; in 15 B.C. he co-operated with his brother Drusus in subduing the Rhæti and Vindelici; warred with the Pannonians (12–9), and in the campaign that followed the death of Drusus traversed Germany between the Rhine and the Elbe. The young Marcellus, nephew of Augustus, had died in 23; Agrippa, son-in-law of Augustus, died suddenly in 12, leaving only two boys of eight and five between the step-son and the succession. Tiberius was now compelled (11) by Augustus to divorce his much-loved wife Vipsania Agrippina, daughter of Agrippa by his former wife Pomponia, in order to marry Agrippa's widow Julia, the profligate daughter of Augustus. Hardly was he married than he was sent to crush a revolt in Dalmatia and Pannonia; Drusus died in 9, and Tiberius marched at the head of his funeral train on foot in mid-winter from the Rhine to Rome, returning immediately to the wars in Germany, for the successes in which he was rewarded with the full *triumph* (9) and other honours. But suddenly in 6 he retired to Rhodes, where for seven years he gave himself to study and to astrology. The open profligacy of the wife who had been forced into his arms was perhaps the most powerful reason which drove him from Rome to the displeasure of the emperor. Before his return (2 A.D.) the infamous Julia was banished to Pandataria (2 B.C.), and within the two years after the deaths of both the young princes Lucius and Gaius (2 and 4 A.D.) paved the way for the adoption of Tiberius as heir to the imperial dignity, the third grandson, Agrippa Postumus, being at once too young and too incompetent for command. He was now formally adopted by Augustus. Tiberius spent the next seven years in active service in north Germany against Maroboduus, in quelling formidable insurrections in Pannonia and Dalmatia, and finally in securing the frontier and taking vengeance upon the enemy who had annihilated the army of Varus in 9 A.D. Along with Germanicus he made two marches into the heart of Germany (9–10), returning to enjoy a splendid triumph (12).

On the death of Augustus at Nola in 14 Tiberius succeeded without opposition. He was fifty-six years old, taciturn, impenetrable, suspicious, beloved by none, yet respected by all for his gravity of demeanour and the reputed severity of his virtue. The first eight years of his reign are treated by Tacitus in the first three books of his *Annals*, and are reluctantly admitted to have been marked by just and moderate government, respect for the laws, frugality, and care for the interests of the provincials. The whole is set down to sustained hypocrisy—a theory of human character hardly to be accepted without hesitation. During this period only twelve state trials for *majestas* ('high treason') are recorded. The next period of the reign, treated in the fourth book of Tacitus, covers the six years 23–28. As yet, according to Tacitus, the evil impulses of Tiberius were restrained by the influence of his still surviving mother. The number of trials for *majestas* has grown to twenty, the espionage of informers has also increased as well as the severity of sentences. His minister Sejanus has grown to vast influence through playing for his own ends upon the morbid suspiciousness of his master. For the last period of the reign, covering eight years and a quarter, we miss the lost fifth book of Tacitus for the years 30–31. The sixth book opens near the close of the year 31, and brings the story of Tiberius through the six years' reign of terror in which 80 to 100 lives perished mostly by direct mandate of the prince down to its shameful close in the foul debaucheries, the gloom, and the insanity of Capreæ.

Such is the gloomy drama of the reign of Tiberius in the splendid pages of Tacitus. It only remains to be seen what are the historically reliable elements of the story. In general terms it may be said that the facts are mainly trustworthy, if the motives imputed cannot always be accepted. There is no doubt that for some years Tiberius took, or affected to take, little active part in public affairs, and indeed throughout one of the deepest principles in his Roman nature was regard for constitutional forms. But his care for the real interests of the provincials was an element new to Roman politics, and showed a foresight and statesmanship to which Augustus had not risen. The only important open changes he made were the permanent encampment of the imperial guard close to the city walls, and the abolition of the old *comitia*, the election of public officers being

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transferred to the subservient senate. But the one fatal feature of the reign was the institution of the *judicia majestatis*, which grew up out of the slavish adulation of the senate, the deep suspiciousness of the emperor's own nature, and the subtle manner in which this was fed by Ælius Sejanus, commander of the prætorian guards. *Delation*, or denunciation of individuals by informers, soon grew to great proportions, and men breathed in a constant atmosphere of terror. In 26 Tiberius left Rome for Campania, and the year after took up his abode in Capreæ, where Suetonius tells us he wallowed in brutish sensualities. He had given his entire confidence to Sejanus, leaving him the whole control of government; but at length awakened to the ambitious designs of his minister, he struck him down without hesitation (31). Macro, the successor of Sejanus, had all his vices without his talents, and so the state of affairs was even worse than before. The murder of Agrippa Postumus in 14, the mysterious death of Germanicus in the East (19), the poisoning of Tiberius' own son Drusus by Sejanus (23), the banishment of Agrippina and the untimely death of her young sons Nero and Drusus (31 and 33) were some of the dark tragedies that befell the house of Augustus under the reign of Tiberius. In his last years the emperor's mind was darkened by gloom, superstition, and perhaps insanity. The famous words Tacitus has preserved of a letter to the senate (*Ann.* vi. 6) seem like a momentary flash of revelation of more than mere remorse: 'May all the gods and goddesses destroy me more miserably than I feel myself to be daily perishing, if I know at this moment what to write to you, senators, how to write it, or what, in short, not to write.' On the 16th March 37 his worn-out frame fell into a sort of lethargy, in which he was suffocated by Macro to prevent his recovery.

The original authorities are Tacitus, Suetonius, and Velleius Paterculus. The first admits that the history of Tiberius was 'falsified, while he reigned, through terror, and written after his death with the irritation of a recent hatred.' Whether the portrait he has himself constructed with such consummate literary art is psychologically possible or no, there can be no doubt at least that his own feeling was too bitter to permit of a judicial estimate. Suetonius as a historical writer shows no discrimination in choosing his materials, and his fondness for scandal and gossip was far stronger than his zeal for truth. Velleius Paterculus had served under Tiberius, but his overdone panegyric gives the fatal suggestion of flattery. Dion Cassius again wrote nearly two centuries after Tiberius, and was wise enough to follow Tacitus pretty closely, the character of Tiberius being a study much too complex for his powers of analysis. Dean Merivale in his *History of the Romans under the Empire* defends Tiberius with moderate zeal, believing him at least the victim of much ancient misrepresentation; Professor Beesly in a preposterous paradox (*Catiline, Clodius, and Tiberius*, 1878) repudiates the whole account by Tacitus as a deliberate and malignant libel. M. Duruy is measured in commendation in his *History*; M. Boissier sums up against him in *L'Opposition sous les Césars* (1875); the Comte Champagny, with vehement invective, in *Les Césars*.

Besides these, see Mommsen's fifth volume of the *History of Rome*, translated as *The Roman Provinces from Augustus to Diocletian* (1886); L. Freytag, *Tiberius und Tacitus* (Berl. 1870); T. Stahr, *Tiberius* (2d ed. Berl. 1873); Pasch, *Zur Kritik der Geschichte des Kaisers Tiberius* (Altenburg, 1866); and Hermann Schiller, *Geschichte der Römischen Kaiserzeit* (Gotha, 1883); also the excellent essay by Henry Furneaux prefixed to his edition of the *Annals* (vol. i. 1884).

Tibet, or THIBET, is the European name of a country in central Asia, lying between China and India. The native name is Bod or Bodyul. Tibet is enclosed between the Kuen Lun and the Himalaya mountains. These chains run eastward from a mountain knot at the southern extremity of the Pamir highland, and continue to diverge from each other till they reach the meridian of Lhassa, when they slightly draw nearer on the east and south-east, where Tibet is bounded by ranges which separate it from China and Indo-China. It is thus surrounded on all sides by mountains, the area so enclosed exceeding in extent 700,000 sq. m., or being eight times the size of Great Britain. Tibet is the loftiest region of such extent on the globe. Its tablelands vary in height from 17,000 to 10,000 feet. It has been estimated that their average height is that of the summit of Mont Blanc; this may be a slight exaggeration, but it impresses on the memory the great elevation of Tibet, the most important fact in its physical geography. The tablelands are loftiest in the west and north, whence they slope gradually to the south and east. Bonvalot certified to the existence of volcanoes. The lowest lands in Tibet are the grooves in which the Indus runs westward and the Sanpo eastward to the bends where they turn to the south, cross the Himalayas, and descend into India. The mountain-girdle which surrounds Tibet has made it an obstacle across which conquerors from Mongolia could not enter India without making a long detour round its western extremity. Another consequence of these barriers has been that Tibet has remained to the present day the region of the globe least known to geographers.

Tibet is divided into provinces equal in extent to European states. These are (1) Chaidam (Tsaidam), a name sometimes given to the country between the Nanshan and Alten-tagh chains and the Kuen Lun. It includes the Koko-Nur lake and the Chaidam marsh, and its cold and scanty pastures are frequented by nomads, among whom is the Tibetan race known as the Tanguts. (2) Katchi, also described as the great northern plain, a lofty region of steppes very little known, but crossed by a road from Kiria in Turkestan, and leading to the gold-fields of Thok-Jalung, one of the highest inhabited spots on the globe. (3) East Nari, including Khorsum and Dokthol, an elevated Himalayan country in which the Indus and Sanpo take their rise. It is a country of pastures with a few cultivated tracts. In it is the Lake Manasarowar, surface 15,000 feet high, a sheet of water sacred alike to Tibetans and Hindus. (4) West Nari, or Little Tibet, consisting of Ladakh (q.v.) and Balti, now dependencies of Cashmere (q.v.) and the Indian empire. (5) Yu-tsang, composed of the provinces of Yu and Tsang. It includes the valley of the Sanpo between the meridians of 87° and 92°, the most populous and important part of Tibet. The Sanpo becomes navigable at Janglache—elevation 13,600 feet. From thence boats formed of a framework of wood covered with hides descend the river. On reaching their destination after being unloaded they are taken down and conveyed by yaks back to the starting-point. Yu-tsang is traversed by a well-frequented road from east to west. The capital of Yu is Lhassa (q.v.); that of Tsang, Shigatze. (6) Kham, the province drained by the upper courses of the great rivers of China and Indo-China, which run in deep valleys, making it difficult to cross the country. Two great roads traverse Kham, connecting Lhassa with Darchiendo (Ta-chien-lu), the emporium of Chinese trade with Tibet. One is the shortest and official road. It passes through Litang (13,400 feet) and Batang (8150 feet) on the Yang-tse-kiang and Chiamdo, the capital of Kham, on the Mekhong, and over lofty passes into Lhassa. The commercial road crosses the rivers higher up, where the watercourses are less difficult and there is an abundance of pasture. Near Darchiendo the country seems to be independent alike of China and Tibet, and farther west is Darge, a district

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described as rich and flourishing. Chiamdo and other parts of Kham are under the direct rule of China.

Tibet lies in the latitudes of Delhi, Cairo, Algiers, and Naples, but its inland position and elevation give it a cold, dry, and extreme climate. On the tablelands at an elevation of 14,000 feet the thermometer in May sinks to 7° F. below zero, and over the whole country an arctic winter prevails for five or six months. Owing to the dryness of the air it loses its conductivity, and the inhabitants, dressed in sheepskins, give out long electric sparks on approaching conducting substances. Flesh exposed to the air does not putrefy, but dries and can be reduced to powder. There is a very short but excessively hot summer, more especially in the valleys of the Indus and Sanpó, where the high temperature is more oppressive to Europeans than that of the Indian plains. The northern and western tablelands are without trees. They abound in steppes, in which pasture innumerable herds of wild animals—yaks, horses, asses, goats, antelopes, &c.—undisturbed by man. The pastures of the southern tablelands supply food to the flocks and herds of a large nomad population. Agriculture is confined chiefly to the valleys of the Indus and Saupo, the grain chiefly grown being barley; the kitchen herbs and fruits of Europe are also cultivated. Agriculture and gardening are difficult arts in Tibet, and the irrigation and terrace cultivation necessary to secure even scanty crops are supposed to have sharpened the intelligence of the peasants and made them strong and laborious. The mineral products of Tibet are of high value, and include gold, silver, iron, copper, zinc, mercury, cobalt, borax, sulphur, &c. The Tibetans are good blacksmiths and cutlers; their chief industrial occupation, however, is the preparation of woollen cloth. They are active traders, and large caravans, in which yaks and sheep are the beasts of burden, are constantly traversing the country on their way to the great fairs in Tibet, and the entrepôts of the surrounding countries. At one time there was a busy commerce with India, but since Tibet became a Chinese dependency the passes have been closed. The most important commerce is in the hands of rich Tibetan and Chinese traders, who jealously watch anything likely to interfere with the existing great routes. Of the distribution of population in Tibet little is known. The most densely peopled part of the country is certainly the basin of the Sanpo, in which are the towns of Shigatze and Lhassa. The population is estimated at six millions.

The Tibetans are a Mongolic race, much more closely allied to the Burmese than to the Chinese or Mongols proper. They are broad-shouldered and muscular, and present a striking contrast to the weak-calved Hindus. They have Mongol features, but not in an exaggerated form. They are said to be intelligent, but without initiative; different views have been taken of their moral character, but on the whole they seem to be kindly and truthful. They are very fond of music and dancing. The Tibetans by race people nearly the whole of Tibet. A few nomads, Mongol and Turkish tribes, have penetrated into the northern steppes, and Chinese in large numbers have colonised the south-east.

In Tibet, owing to its isolation, some archaic customs survive. One of these is polyandry, the husbands of one wife being generally brothers. This form of marriage is almost universal among the poor, and seems to give rise to less domestic trouble than might have been expected. The rich are polygamists. Both systems check population. In Little Tibet, where monogamy has penetrated from the west, population increases rapidly. There exist in Tibet two religions: (1) the Bon or Bon-Pa creed, which is a development of Mongol Shamanism, and is the native religion; and (2) Lamaism (q.v.), a form of the Buddhism introduced from India. The Tibetan clergy are very numerous, there being, it is estimated, one monk for every family. Monasteries and convents are everywhere. In Tibet the performance of elaborate ceremonies is held to be more important than good works, and can only be carried out with the aid of the clergy, who are said to be avaricious, idle, and dissolute.

Since 1720 Tibet has been a dependency of China, which, however, interferes only with foreign and military affairs. Two imperial Chinese delegates reside at Lhassa, one, the amban, the superior of the other; Rockhill says his authority is really infinitesimally small, though he writes despatches as if master of the situation. Civil and religious government are left to the Tibetan clergy, as they were in the old Papal States. In theory supreme rule is in the hands of the Dalai Lama, the sovereign pontiff who resides at Lhassa. The Tesho or Bogdo Lama, who has an inferior spiritual power, resides at Shigatze. The Dalai Lama hands over the active duties of government to the de-sri or king, who rules with the assistance of four ministers. The Tibetan language as spoken differs much from the old written language; it has been losing its monosyllabic character. Books abound in Tibet, and every monastery has its library. The literature consists chiefly of translations from the Sanskrit, and of religious works.

The earliest date in Tibetan history which can be relied on as historical is 639 A.D., when the king Sbrong-tsan-Sgam-po introduced Buddhism from India, and founded Lhassa. His dominions extended from the Himalayas north to the Koko-Nur Lake. In the middle ages down to the 10th century the Tibetan country is said in the Chinese annals to have extended to the Gulf of Bengal, then described as the Tibetan Sea. In the 9th century a war broke out with China which terminated in 821, when bilingual tablets still existing were erected at Lhassa. In 1071 Eastern Tibet was broken up into small states, opening the country to Chinese and Mongol invasion. Kublai Khan, who annexed Tibet to his vast empire, called to his court a Tibetan monk, Phagspa. The latter converted his patron and the Mongols to Buddhism, and the sovereignty of Tibet was conferred on the Dalai-Lamas. In 1720 the Chinese, after many struggles, finally conquered Tibet. Seven years later Batang and other parts of Kham were detached from Tibet, and incorporated with the Chinese province of Sze-chwan. Early in the 18th century Lamas, under the guidance and instruction of Jesuit missionaries, carried out a survey of the Tibetan part of the Chinese empire. From the information supplied D'Anville in 1733 prepared a map of Tibet not yet altogether superseded. In 1840 Ladakh was conquered by the Maharajah of Cashmere, and now is a British dependency. In 1854 there was a struggle between Tibet and Nepal which ended in a treaty by which both countries recognised the suzerainty of China. Eleven years later, in consequence of the refusal of the Tibetan authorities to allow Europeans to enter their country, a system was organised in the interest of science, by which pundits or educated Indians were sent as explorers into Tibet. By this means the old maps have been corrected and much valuable geographical knowledge has been obtained. Prejevalski and other Russian explorers have done for Northern Tibet what the pundits have done for the south. Sikkim, a frontier state through which passes an important route from India into Tibet, became a British dependency in 1850. In 1888 it was attacked by a Tibetan force, and, as the

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Chinese government declined and probably was unable to interfere, the invaders were punished by the Anglo-Indian troops. The question was finally settled in March 1890. The Chinese disavowed the war and recalled their amban from Lhassa. Britain retained her possessions. In 1889–90 the journey of M. Bonvalot and Prince Henri d'Orleans across central Asia from Kuldja to Tonquin attracted the attention of French politicians and English merchants. It was said to prove how Russia and France might join hands in Asia. France was to extend westward the frontier of Tonquin to the navigable Mekhong River, and thus secure exclusive possession of the great route into Yunnan and Western Sze-chwan, Chinese provinces belonging geographically rather to Tibet than to China; but the practical efforts of the French to open their route have signally failed.

See the travels of Abbé Huc (q.v.); Hodgson, *Essays on the Languages, Literature, and Religion of Nepal and Tibet* (1874); Markham, *The Mission of G. Bogle to Tibet and T. Manning to Lhasa* (1876); Lieutenant G. Kreitner, *Im Fernen Osten* (Vienna, 1881); H. A. Jäsche, Tibetan Grammar (2d ed. 1883), and *A Tibetan-English Dictionary* (1882); Prejevalski (q.v.), *Reisen in Tibet* (Ger. trans. 1884); Desgodins, *Le Thibet* (2d ed. 1885); Feer, *Le Tibet* (1886); W. W. Rockhill, *Land of the Lamas* (1891); G. Bonvalot, *Across Tibet* (Eng. trans. 1892); A. E. Pratt, *To the Snows of Tibet through China* (1892).

Tibet Dog. See MASTIFF.

Tibullus, ALBIUS, Roman elegiac poet, a native, it is believed, of Gabii. His birth-year is fixed about 54 B.C., but his prænomen and parentage are unknown, though he was certainly born to a considerable estate, much reduced, however, in the subsequent confiscations by which Octavian and Antony rewarded their legionaries. His father seems to have died early, but his mother and sister survived him. While still a youth he acquired the friendship of the orator, poet, and statesman, M. Valerius Messala, head of a literary coterie only less attractive than that of Mæcenas. As in Queen Anne's day, literature was a direct passport to office under government, and the already marked poetic gifts of Tibullus procured him a place on the staff of Messala commissioned by Augustus, 30 B.C., to crush a revolt in Aquitania. In this campaign the poet displayed capacity enough to win him distinction and decorations, but these could not countervail his repugnance to a soldier's life. Accordingly the close of the war found him dividing his time between the society of Rome and the retirement of Pedum at the base of the Tusculan and Sabine hills. He fell in love with a 'grass widow,' Plania by name, whose husband was on service in Cilicia. Under the sobriquet of Delia she is the heroine of his first book of elegies, but his devotion did not survive the deception she practised on him, finding as he did that he was not her only lover. It was during the earlier period of this attachment that, at Messala's instance, he started with that statesman on a mission to Asia; but, having sickened on the voyage, he got no farther than Corcyra. In his second book of elegies 'Delia' is replaced by 'Nemesis'—this *innamorata* being a fashionable courtesan, with many other admirers besides Tibullus, who bemoans his bondage to her and stigmatises her rapacity, but yet cannot bring himself to drop her.

Tibullus died 19 B.C., immediately after Virgil, universally deplored in Rome, and years afterwards the subject of a magnificent elegy by Ovid. Doubt has been thrown on his identity with the Albius of Horace, but we are loth to part with the picture that poet gives of him, pacing pensively his woodland walks at Pedum, blessed with fortune, with personal beauty, and with all the capacities of refined enjoyment. His character, amiable, generous, loyal to his friends and constant to the mistresses who deceived him, but wanting in strength and energy, is reflected in his poems, which, 'most musical, most melancholy,' by their limpid clearness and their unaffected finish still justify Quintilian in placing him at the head of Roman elegy properly so called. Grace, tenderness, pathos, conveyed in verse smooth without monotony, can, however, only abate, not remove, the impression he leaves of lack of the dramatic force characteristic of Propertius or of the masterly range commanded by Ovid. The third book can hardly, even in part, be considered as his, while the fourth, also by another hand, is yet memorable for the eleven poems on the loves of Sulpicia and Cerinthus—Sulpicia's being unique as specimens of a Roman lady's passionate outburst in verse.

Till Lachmann's edition (1829) not much was done for the text of Tibullus, though his interpretation has advanced but little beyond the older Heyne. The most critical and on the whole useful edition is that of Bährens (1878). See Ribbeck's *History of Latin Poetry;* the Rev. James Davies, *Catullus, Tibullus, and Propertius* ('Ancient Classics' series, 1876); Teuffel and Sellar. The best English translation is Mr James Cranstoun's (Edin. 1872).

Tibur. See TIVOLI.

Tic Doloreux. See NEURALGIA.

Tichborne, a Hampshire property, 2 miles SSW. of Alresford station and 6½ E. by N. of Winchester. It has from before the Conquest been the seat of the Tichbornes, a Catholic family who received a baronetcy in 1626. After the death of the eleventh baronet, Sir Alfred Joseph Tichborne (1839–66), a butcher from Wagga Wagga in Australia, Thomas Castro, otherwise Arthur Orton of Wapping, came forward to personate an elder brother, Roger Charles Tichborne (1829–54), who had been lost at sea off the coast of America. His case collapsed on 6th March 1872, the 103d day of a trial to assert his claims; and the 'Claimant,' being committed for perjury, was on 28th February 1874, the 188th day of this new trial, whose cost was £55,315, sentenced to fourteen years' imprisonment with hard labour. See Sir Alex. Cockburn's Charge (2 vols. 1875).

Ticino, a river of Switzerland and the north of Italy, rises on the southern slopes of Mount St Gothard, and flows south through Lake Maggiore, and south-south-east through the north of Italy to its junction with the Po, 4 miles below Pavia. For the last 75 miles of its course, from the point at which it leaves Lake Maggiore, it is navigable. For the battle here in 218 B.C., see HANNIBAL, p. 544.

Ticino (Ger. *Tessin*), the most southern canton of Switzerland, bounded on the W. and S. by Italy, and on the E. by Italy and the canton of Grisons. Area, 1082 sq. m.; pop. (1888) 126,751. Its surface forms a portion of the southern slope of the Alps. In the south the country falls away into flats, and the scenery becomes Italian in character. The principal river is the Ticino (q.v.); and the canton is traversed by the St Gothard railway. In the north cattle-breeding and the preparation of dairy-produce are the chief employments. South of the Alpine regions are elevated forest-clad districts; and farther south olive-yards and vineyards, cornfields and plantations of figs, almonds, oranges, citrons, and pomegranates occur. The canton varies as much in climate as in productions. The northern part of Lake Maggiore and almost the whole of Lake Lugano are included within the canton. The inhabitants for the most part speak Italian, and are Catholics. The largest town is Lugano; since 1881 Bellinzona is the capital.

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Tickell, THOMAS, poet, was born in 1686 at Bridekirk in Cumberland, and had his education at Queen's College, Oxford, a fellowship of which he held (without orders by dispensation) from 1710 till 1726. His complimentary verses on *Rosamond* (in Tonson's Sixth Miscellany, 1709) gained him the favour, his own virtues the friendship of Addison, who introduced him both into the world of letters and public life, and on becoming in 1717 Secretary of State made him his under-secretary. He held the office of secretary to the Lords Justices of Ireland from about 1725 till his death, at Bath, 23d April 1740. He was skilful and timeous in occasional poetry, as in *The Prospect of Peace* under Queen Anne, and *The Royal Progress* at the arrival of George I., and he was puffed with all the partiality of affection in the *Spectator*. The most memorable incident in his life was his translation of the first book of the *Iliad* about the same time as the first part of Pope's *Homer*. Addison declared that the rival versions were both good, but that Tickell's was the best that ever was made. Pope believed, or professed to believe it the work of Addison himself, deliberately prepared to eclipse his version, and wrote in reply the famous satire on Atticus. But there need be no doubt that Tickell made his own translation, although Addison corrected it, as he confessed he did. Tickell's 'letter to Avignon,' says Johnson, 'stands high among party poems; it expresses contempt without coarseness, and superiority without insolence.' His longest poem is *Kensington Gardens;* his most popular, the ballad of *Colin and Lucy;* his finest, the exquisite elegy to Addison prefixed to his edition of Addison's Works (4 vols. 1721).

Ticket of Leave. See PRISONS, p. 419.

Ticknor, GEORGE, the historian of Spanish literature, was born in Boston, 1st August 1791, the son of a wealthy New Englander, who was one of the first importers of Merino sheep into the United States. He graduated at Dartmouth College (1807), and was admitted to the bar (1813), but, having practised for a twelvemonth, became convinced that the life of a lawyer would not satisfy his ideas of usefulness or happiness. He accordingly turned his thoughts to plans of study and travel, and, starting for Europe in 1815, for four years resided successively in London, Göttingen, Paris, Geneva, Rome, Venice, Madrid, and Lisbon. Everywhere he mixed in the best society; and his journal is full of the best sort of interviewing, his friends and acquaintances then or afterwards including Joanna Baillie, the Duc de Broglie, Chateaubriand, Miss Edgeworth, Goethe, Guizot, Hallam, Lord Holland, President Jefferson, Jeffrey, Longfellow, Lyell, Macaulay, Metternich, Milman, Prescott, Rogers, Scott, Sydney Smith, Southey, Earl Stanhope, Mme. de Staël, Talleyrand, Thackeray, Daniel Webster, and Wordsworth. Returning to America, he became professor of French and Spanish and of the Belles Lettres in Harvard University. In 1835 he resigned his chair, and went with his family to Europe, where he remained three years, collecting materials for his great *History of Spanish Literature* (3 vols. New York, 1849), an exhaustive and admirable work, which has been translated into Spanish and German. Other works by him were Lives of Lafayette (1824) and Prescott (1864), with fourteen reviews and minor writings. He received nearly a score of literary distinctions; in 1856 revisited Europe; and died in Boston, 26th January 1871, in his eightieth year. See his *Life, Letters, and Journals* (2 vols. 1876).

Ticks (Ixodidæ), a family of mites (Acarina) the members of which attack man, cattle, dogs, birds, reptiles, and some other animals. They live in woods or among thick vegetation, and it is likely that their primary food-supply is derived from vegetable juices; but they are always ready to fasten on some passing animal, and are troublesome pests in tropical and semi-tropical countries. The mite-like body has a tough skin; there are four pairs of clawed legs; the mouth-parts consist (1) of a paired anchoring organ or 'rostrum,' covered with recurved hooks, and equivalent to a 'maxillary lip' or to the pedipalps of other Arachnids, and (2) of a pair of sharp mandibles which play backwards and forwards in two longitudinal channels on the rostrum. Fastening themselves to the skin of an animal, they cut a hole and suck the blood. If allowed to feed till they are satisfied, they withdraw the rostrum and drop off. The sexes differ in appetite, the male being readily satisfied, while the female of some species sucks until, from an almost microscopic size, she becomes the greater part of an inch long. Yet some have been known to survive without food for at least four years. When the satisfied female drops off, she returns to the herbage and begins to lay eggs. Dr A. D. Michael says 'she places the eggs one by one in front of her in a pile or round ball, which gradually becomes almost as large as the mother-Ixodes. It is probably this position of the eggs which gave rise to the idea held by some of the earlier writers that the Ixodes laid their eggs through the mouth-opening; the fact being that the genital opening is very near the mouth, and the position during oviposition such that the mouth is not readily seen.' The typical genus Ixodes includes many species—e.g. the American White-spotted Tick *Ixodes albipictus* and the European *Ixodes ricinus;* the blind genus Argas is well represented by *Argas reflexus*, common on pigeons; *A. persicus*, which produces troublesome punctures on man; and *A. nigra*, sometimes called 'the pique.' It is said that in warm countries the bites sometimes produce fevers, convulsions, delirium, and even death; but Mégnin's experiments (in Europe) lead one to suspect that the danger of the bite has been much exaggerated. As the hasty removal of the tick is certain to leave the rostrum in the wound, the pest should be stimulated with a drop of turpentine or benzole.

Fig. 1.—*Ixodes ricinus*, fem.: *a*, mouth; *b*, opening of oviduct; *c*, anal valves; *d*, stigma.

Fig. 2.—Upper and under surfaces of *Argas reflexus*.

The sheep-tick (Melophagus; see SHEEP-LOUSE) is a Dipterous insect, and to the same order belong the species of Nycteribia on bats and of Ornithomyia on birds. The 'death-tick' is a popular name for Pseudoneuropterous insects of the family Psocidæ—e.g. Psocus, Cæcilia, and Clothilla—or for the little Death-watch (q.v.; Anobium).

See ACARINA; also A. Pagenstecher, *Beiträge zur Anatomie der Milben* (Leip. 1860-61); P. Mégnin, *Les Parasites et les Maladies Parasitaires* (Paris, 1880); A. D. Michael, *British Oribatidæ* (1884), and separate memoirs on Ticks.

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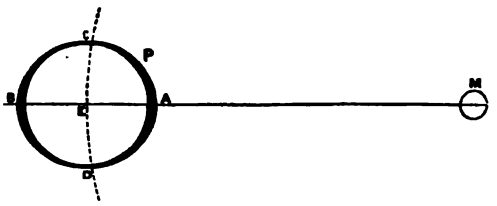
Ticonderoga, a township of New York, 100 miles by rail N. of Albany, on Lake Champlain, and enclosing the outlet of Lake George, whose falls supply water-power for several factories. Black lead and iron also are mined; and here the lake steamers start. Pop. 3400. Here the French built a fort in 1755, which, after repulsing a first attack in 1758, they dismantled and abandoned in 1759, along with Crown Point. The English enlarged and strengthened both fortresses at a cost of £2,000,000; but, being garrisoned with only 50 men after the cession of Canada to Great Britain, it was in 1775 surprised and captured by Ethan Allen. In 1777 it was recaptured by Burgoyne, and in 1780 it was again occupied by the British; at the close of the war it fell into ruins. See Cook's *History of Ticonderoga* (1858).

Tides. To an observer on the seashore no phenomenon is more striking than the rise and fall of the water, the rhythmic ebb and flow which we know as the tides. Roughly speaking, the water reaches its highest level, or high-tide, twice each day, and similarly each day witnesses two low-tides. A little observation soon shows that the time at which high-tide occurs varies from day to day. Thus, if the high-tide occurred at noon yesterday it may not occur till one o'clock to-day. After the lapse of a week low-water will occur about the hour at which high-water was first observed, and high-water at the former time of low-water. When a fortnight has passed the times of high and low tide will be very similar to what they were when first noted, and so on regularly through the year. If these observations of the rise and fall of the tide are combined with lunar observations it will be found that high-water at any place occurs on the average a definite interval after the meridian passage of the moon. The close connection between the age or position of the moon and the time of high-water was recognised long before the true dynamical connection between them was discovered.

Close observation of the height of the tide from day to day will soon disclose the fact that this height varies. For example, on one particular day the tide will rise very high and fall very low; a week later the high-tide will come considerably short of the highest attainable, and the low-tide will not fall as low as the lowest attainable. After the lapse of another week the very high and very low tides will again occur, and so on, timing accurately with the four quarters of the moon. These extreme tidal variations are distinguished as spring-tides and neap-tides. Thus, at London Bridge the average range of the spring-tides is 20 feet 8 inches, that of the neap-tides 17 feet 3 inches. At Leith the corresponding numbers are 16 feet 4 inches and 12 feet 9 inches. Under certain conditions spring-tides rise very high, overflowing low-lying portions of towns and villages.

The general explanation of the phenomenon of the tides was given first by Newton. He supposed the ocean to cover the whole earth, and to assume at each instant a figure of equilibrium under the combined gravitation influence of earth, sun, and moon. The real problem is, however, a kinetic one, and as such was attacked by Laplace. Both the equilibrium and kinetic theories agree in explaining the broad features of the tides. Their results differ in important details, and neither satisfactorily represents the facts. There is no doubt, however, that the failure of the kinetic theory in this respect arises from our inability to take proper account of the configuration of land and sea, of the varying depths of ocean, and of the effects of fluid friction. It is impossible without mathematics to give any account of the kinetic theory. It must suffice to say that the problem consists in finding the forced oscillations of the ocean under the periodic tidal action of the sun and moon. Meanwhile we shall consider the faulty equilibrium theory, and see how far it explains the principal tidal phenomena described above.

Let M be the centre of the moon, and E that of the earth. Imagine a sphere, CD, described with M as centre and passing through E. Then it is evident that all particles on the nearer side to the moon will be more strongly attracted than those on the farther side of this spherical surface. Thus, if A is the nearest point on the earth to the moon and B the farthest distant point, there will be a greater



pull towards M at A than at E, and at E than at B. Again, at any point, P, which lies off the line ME, there will be a pull inwards towards ME. And thus, if fluid covers the whole surface APB, there will be a heaping up of the waters (relatively to E) at A and B and a sinking of them at C and D. The approximately spherical figure of the water-surface will be forced to take a spheroidal form, with greater axis pointing towards the moon. This form will follow the moon in its apparent daily course, and the result will be that twice every lunar day (24 h. 54 m.) high-tides and low-tides will be experienced at every point on the surface for which the moon rises above the horizon. This so far agrees with observation; but it is not found that in general the high-tide occurs simultaneously with the passage of the moon across the meridian. When it does, it is because the high-tide has, through the configuration of land and sea, lagged behind the moon by a whole half-day at least. At islands in the open sea or at ports looking eastwards across a broad ocean the time of high-tide is generally a few hours later than the meridian passage of the moon.

Now the sun as well as the moon will produce tides. The tide-generating power of a given body may be taken as proportional to the difference of the attractions exerted on the nearest and the farthest distant points of the affected globe. For example, if m is the moon's mass, its tide-generating power will be proportional to $m/MA^2 - m/MB^2$ (see GRAVITATION). But

$$\frac{1}{MA^2} - \frac{1}{MB^2} = \frac{MB^2 - MA^2}{MB^2 MA^2} = \frac{(MB + MA)(MB - MA)}{MB^2 MA^2}$$

$$= \frac{2ME \cdot AB}{ME^4} \text{ approximately } = \frac{2AB}{ME^3}.$$

Hence the tide-generating power will be proportional to the mass and to the inverse cube of the distance of the tide-producing body. Now the sun's mass is nearly 2,700,000 times the moon's mass, and the sun's distance is about 390 times the moon's distance. Consequently the sun's tide-generating power should be to the moon's in the ratio of 2,700,000 to 390^3—i.e. roughly, 5 to 11. At new and full moon the tides due to the sun and moon will fall crest to crest and trough to trough, and the total tide may be represented by 16 (5 + 11). On the other hand, at times of half-moon the crest of the lunar tide will coincide in position with the trough of the solar tide, and the resultant tide may be represented by 6 (11 − 5). Here we have at once the explanation of the spring and neap tides. In general the spring and neap tides do not

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differ by nearly so much as these numbers indicate. The spring-tide is seldom a half greater than the neap-tide. By the theory, spring-tides should occur at new moon and full moon, and neap-tides when the moon is in quadrature. In fact they occur about one and a half days later than the corresponding astronomical combinations.

As the moon passes through its first quarter the solar tide having a shorter period gradually shoots ahead of the lunar tide. For any position between new and half moon the crest of the resultant tidal wave will therefore pass a little sooner than it would if the moon alone were acting. Similarly for any position between half moon and full moon —that is, during the second quarter—the crest of the resultant tide will lag behind the position it would occupy were the moon the sole agent. In the former case the tide is said to *prime* and in the latter to *lag*. The same phenomena occur in the third and fourth quarters. This priming and lagging of the tide are very evident phenomena. Their effect may be readily observed by inspection of any table of tides, in which the intervals between successive high-tides will be found to vary considerably. As the time of maximum priming is being approached the successive tides follow each other at shorter intervals than they do when the time of maximum lagging is being approached.

When the moon is in the plane of the equator, the two daily tides at each point on the water-surface (supposed uniform) will be approximately equal. But if the moon is, say, north of the equator, then for any point on the north side of the equator the tide corresponding to the meridian moon will be a little higher than the other, since the tidal spheroid has its long axis inclined to the equator; and for any point on the south side of the equator this tide will be the lower of the two. When, on the other hand, the moon is south of the equator it is for southern latitudes that the higher tide is the one corresponding to the moon's meridian passage. It is usual to represent this phenomenon as due to a diurnal tide superposed upon the semi-diurnal tide. The lunar diurnal tide does not exist when the moon's declination is zero; and it vanishes at the equator and the poles. There is also a solar diurnal tide depending on the sun's declination. Then there are the tides of long period—viz. the *fortnightly* tide depending on the elements of the moon's orbit round the earth, and the *semi-annual* tide depending on the elements of the earth's orbit round the sun.

Tidal phenomena, as observed at different localities, present very complicated features, which it would be hopeless to attempt to describe. Two tidal waves flowing round the opposite extremities of continents or islands may meet again, and give rise to very peculiar effects. The four daily tides observed at Colombo are referred to this cause; and a similar explanation probably holds for the very extraordinary case of Papiete, one of the Society Islands, where the high-tide occurs invariably between noon and 2 P.M. In the Pacific islands generally the tide is small, frequently not exceeding 2 feet. In bays again high-tides are generally experienced. The phenomenon in its simplest form is shown in the Bay of Bengal, in which the tide gets higher as it advances along the narrowing channel. The exceptionally high tides in the Bay of Fundy are due to the same cause, combined with the fact that two tidal waves meet off its mouth. The *Bore* (q.v.) or wave which runs up estuaries is another illustration of the same phenomenon (see also CHEPSTOW). In the Mediterranean Sea we have the case of a not very extensive sheet of water communicating with the outer ocean by a narrow strait. The result is that in its central parts (at Malta for example) there is no appreciable tide. At the head of long bays, such as in the Adriatic, the tide is, however, quite evident, though small. In straits and estuaries the ebb and flow of the tide is frequently accompanied by strong currents. These tidal currents have been utilised as a source of power at various places (Argostoli, Burntisland, Woodbridge, &c.). Their generally intermittent character limits their operation somewhat. It has also been suggested to use the rise and fall of the tides for driving dynamo-electric machines, so as to transform tidal energy into electric energy; but no practical scheme has as yet been devised. Obviously experiments of this kind could be best carried out where either high-tides or strong tidal currents are experienced.

It is customary to apply the term tidal wave to any large wave which, even though it be but for a short time, causes an exceptional rise of sea-level along a shore. Such waves very frequently accompany Earthquakes (q.v.). They are in no true sense *tidal*.

Tidal machines are of two classes. Those of the one type are intended to record at any given place the march of the tide. This is effected by an arrangement of floats; and the record is made by a pencil bearing on a revolving cylinder. Such machines are called tide gauges. The other kind, first imagined by Lord Kelvin, is for predicting tides at any place whose various tidal constituents have been determined by harmonic analysis from the record of the tide gauge. Each harmonic constituent is produced by motion of a pulley; and a single cord passing round all the pulleys, which by their motions give the different harmonic constituents, compounds those motions, the resultant being recorded on a revolving cylinder by a pencil fixed to the free end of the cord.

Corresponding to the tides as they exist in the fluid portion of the earth there are tidal stresses in the solid crust. These are resisted by the rigidity of the material; but it is possible that they may be a factor in the production of Earthquakes (q.v.). G. H. Darwin has considered the question as to whether there is any yielding of the crust under the influence of the long period tidal stresses. He finds evidence of a slight yielding, showing that the earth has an effective rigidity about equal to that of steel.

In the evolution of worlds tidal action has had a very important influence. It has long been recognised that in the case of the earth the tidal wave must act as a kind of friction-brake, gradually retarding the rate of rotation. But any such change in the rate of rotation of the primary body must be accompanied by changes in the distance and time of revolution of the moon. Calculating backwards in time G. H. Darwin has found that originally the moon must have been much nearer the earth. Previous to the time of its existence as a distinct satellite it was part and parcel of the earth; and its origin as a satellite is believed to have been due to the tidal action of the sun acting upon a fluid or semi-fluid body whose period of rotation was nearly equal to its natural period of oscillation. Thus the properly timed tidal impulses acted so as to produce large tidal distortions, which finally resulted in the separation of the body into two parts. The tidal action of the earth upon the moon has long ago compelled the latter to rotate upon its axis in exactly the same time as it revolves in its orbit. For there can be little doubt that before the moon had cooled down to its present unchangeable condition very large tides must have been generated in it, and these would act as friction-brakes so long as the period of the moon's axial rotation was shorter than its time of orbital revolution. There is evidence that Jupiter's satellites have the same peculiarity; and it is now believed

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that Venus and Mercury have their day equal to their year. The greater proximity of the sun to the two inferior planets would produce correspondingly greater tides with correspondingly quicker reduction of the axial to the orbital period.

Tideswell, a small town of Derbyshire, 6¼ miles E. of Buxton, with an old cruciform church, and some silk manufactures. Pop. 1985.

Tieck, JOHANN LUDWIG, one of the most prominent champions of Romanticism (q.v.) in Germany, and the friend of Novalis and the Schlegels, was born in Berlin on 31st May 1773. Most of his life was spent in that city, in Dresden, and near Frankfort-on-the-Oder, his life's calling being that of a man of letters; and in Berlin he ended his days, on 28th April 1853. After two or three immature romances, he struck out a new line in clever dramatised versions of the old fairy-tales, such as Fair Eckbert, Puss in Boots, The Faithful Eckhart, Blue Beard, and others, which he made the vehicle for some polished satire on contemporary literature. This is Tieck's peculiar groove. He followed up this first success—*Volksmärchen von Peter Lebrecht* (1797)—by publishing the tragedy *Leben und Tod der Heiligen Genoveva* (1800), the comedy *Kaiser Octavianus* (1804), and *Phantasus* (1812–17), a collection of the same class of traditional lore in story and drama. These books became great favourites in Germany, owing to the simple and agreeable style of the narrative, and the dreamy fancy and delicate irony that pervaded them. Another great favourite was a romance in glorification of art, entitled *Franz Sternbald's Wanderungen* (1798). In his later years Tieck wrote several works of a more modern cast, of which *Die Gemälde*, *Die Reisenden*, *Die Verlobung*, *Hexensabbath* are amongst the most highly esteemed. Besides superintending the completion of A. W. Schlegel's translation of Shakespeare's plays—it was long erroneously believed that he had translated them himself—he edited the doubtful plays and wrote a series of essays (*Shakespeare's Vorschule*, 1823–29). *Don Quixote* he did translate with his own hand (1799–1804). He holds an honourable place in the ranks of Germany's dramatic and literary critics, in virtue of his *Dramaturgische Blätter* (2d ed. 1852) and *Kritische Schriften* (1848). Tieck's *Schriften* were published in 28 vols. in 1828–54, and his *Novellen* in 12 vols. in 1852–54. Some of his fairy-tales and novels were translated into English by Carlyle and Thirlwall. See biographies by Köpke (1855) and Friesen (1871); and Carlyle's *Essays*, vol. i.

Tiel, a Dutch town in Guelderland, on the Waal, 60 miles E. by S. of Rotterdam. Pop. 9431.

Tiele, CORNELIS PETRUS, Dutch theologian, was born at Leyden, 16th December 1830, studied at the university there and at the Remonstrants' seminary at Amsterdam, and became Remonstrant pastor at Rotterdam (1856), professor in the seminary translated to Leyden (1873), and professor of the History of Religions in the university of Leyden in 1877. From its foundation in 1867 he collaborated with Kuenen, Loman, and Rauwenhoff in editing the well-known *Theologisch Tijdschrift;* and he has published a long series of important theological works. Of his writings there have been translated into English the *Comparative History of the Egyptian and Mesopotamian Religions* (1869–72; Fr. trans. 1882; Eng. by James Ballingal, part i., *The Egyptian Religion*, 1882); *Outlines of the History of Religion to the Spread of the Universal Religions* (1876; Eng. trans. by J. E. Carpenter, 1878). Other works discuss the Gospel of John as a source of the Life of Jesus (1855), the Religion of Zarathustra (1864), *Babylonisch-assyrische Geschichte* (1886–87), &c.

Tien-tsin, a large city and river-port of China, in the province of Chih-li, on the right bank of the Pei-ho, 34 miles from the mouth of the river. It is the port of the city of Peking, from which it is distant 80 miles SE. The river is generally frozen over from about the 15th December to the 15th March, and the business at other times carried on by means of boats and junks is taken up by sledges, which swarm on the river. By the treaty of Tien-tsin, signed here in 1858, the port was declared open; and a British consulate was established in January 1861, while part of the allied troops were still here (see CHINA, Vol. III. pp. 192, 193). In 1881 Tien-tsin was connected by telegraph with Shanghai (the line extending to Peking); and there is a railway from Tien-tsin to the mouth of the Pei-ho, which will ultimately be extended to Shanghai. The imports have an annual value of £400,000 or £500,000, the exports about £1,000,000. There is also a large and rapidly increasing transit trade with Russia *vid* Siberia. Pop. estimated in 1890 at 950,000.

Tiepolo, GIOVANNI BATTISTA, the last of the great Venetian school, was born at Venice 5th March 1692, and modelled himself on Paul Veronese. His first works were in the adornment of churches and palaces in and about Venice; in 1750–53 he executed a great series of frescoes in the archiepiscopal palace at Würzburg, and in 1760 was engaged on the palace of Madrid. At Madrid he died, 27th March 1769. He was a most productive painter, rich in colour (especially in his easel pictures), and clear (though incorrect) in drawing. His chief works were the Old Testament histories—the palace at Udine and the frescoes at Madrid. His two sons were also painters, and like their father etchers also. See Molmenti, *Il Carpaccio e il Tiepolo* (Turin, 1885).

Tierney, GEORGE (1761–1830), Whig politician, was one of Pitt's most persistent opponents, and fought a bloodless duel with him (1798). He held office in the ministries of Addington, Grenville, Canning, and Goderich. He was a clever debater, notorious for his powers of sarcasm.

Tierra del Fuego consists of a group of several large and numerous small islands, lying off the south extremity of South America, in 54° S. lat., 70° W. long., and separated from the continent by the Strait of Magellan. Its farthest south point is formed by Cape Horn. The principal island, Tierra del Fuego, sometimes known as King Charles South Land, is divided between Chili and the Argentine Republic, to the latter of which Staten Island also belongs. All the other islands and islets are included in Chili. The shores of the archipelago are generally much broken by and indented with bays and arms of the sea, with mountains rising abruptly from the water. These fjords, as a rule, contain deep water at their shoreward extremities, with bars, or, more properly, banks at the sea entrances; in this feature, as well as in their scenery, resembling many of the salt-water lochs on the west coast of Scotland. The whole group is mountainous, the high hills of the mainland (Tierra del Fuego) attaining a height of 7000 feet, the snow-line being at an altitude of 4000 feet above sea-level. There are some dreary plains and a few fertile river-valleys, with areas of marshy ground between Useless and St Sebastian Bays. None of the rivers are important, unless it be the Juarez Celman, which is believed to be navigable for a considerable distance above its mouth. Towards the north the plains produce good pasturage, and attempts at sheep-farming have been made in the district, the Jesuit missionaries on Dawson Island having a farm with nearly 20,000 sheep and over 6000 cattle. Forests of

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beech, winter's bark, magnolia, and cypress cover large areas, with dense growths of such bushes as Berberidæ, Escallonia, *Ribes magellanica*, Embothrium, *Myrtus mummularia*, and Salicemiæ on the hill slopes. Lichens grow abundantly at greater heights, and cover much of the low grounds, where, apparently, nothing else can flourish. The more common and old-fashioned English garden flowers come to perfection in the settlers' enclosures in the extreme north. Few island groups situated so close to continental land exhibit a poorer fauna than is here presented, the guanaco, tucu-tucu (a small rodent), dog, fox, and rat being the only quadrupeds, with the exception of the lately introduced farm stock. The dog is semi-domesticated, and is kept by the natives in immense numbers. Birds, however, are abundant and various, including *Vanellus cayanus*, *Surnia funerea*, owls, gulls, falcons, and a great variety of sea-birds. Seals and sea-lions, once almost innumerable along the shores, have grown scarce and wild, especially in the northern portion.

The land of Tierra del Fuego is rapidly rising, and the coast-line has advanced 3 kilomètres since the date of the surveys of Captains King (1826–28) and Fitzroy (1831–36). The rocks are principally volcanic, but sedimentary strata are not uncommon on the principal island, and probably on some others. Granite, syenite, porphyry, quartz, serpentine, trachite, diorite, and sandstone comprise the principal rocks. Some coal, of a poor description, and a little gold have been found. The situation of the islands exposes them to a series of conditions which render their climate the most tempestuous in the world. The prevailing winds are from the west, beginning to blow with the rise of the sun, and increasing in violence until dusk, when a calm may generally be looked for with confidence. During the short summer the winds blow from the north. Settled weather never lasts for more than a fortnight at a time. December, January, and February are the warmest months. March is exceedingly boisterous always, and during its course occur the most destructive gales.

The people are savages of a low type, divided into three tribes, the Onas (or Aonas), the Yaghans, and the Alakalufs, the Yaghans being now supposed to be the aborigines. The Onas are tall, the others short and stunted in stature. The charge of cannibalism once brought against them appears to be unfounded. They number about 8000 souls.

See Burney, *Voyages*, ii.; Fitzroy, *Survey of the Straits of Magellan*; Macdonall, *Voyage to Patagonia*; Weddell, *Voyage towards the South Pole*; Snow, *Two Years' Cruise*; Darwin, *Voyage of a Naturalist*; Popper, *Exploration of Tierra del Fuego*; Margrim, *La Terre de Feu*; Cunninghame, *Straits of Magellan*; Coppinger, *Cruise of the Alert*; Ball, *Notes of a Naturalist*; *Scot. Geog. Mag.*, vols. iv. vii.; *Compte Rendu*, Paris Geog. Soc. (1891); Reports of French Transit of Venus Expedition (vol. vii., Ethnography, 1892); *United States Sailing Pilot*, No. 85.

Tiers État. See STATES-GENERAL.

Tietjens. See TITIENS.

Tiffin, capital of Seneca county, Ohio, on the Sandusky River, 43 miles by rail SSE. of Toledo. It is the seat of Heidelberg College (Reformed Church; 1851), and manufactures farming implements, churns, stoves, woollens, &c. Pop. 10,801.

Tiflis, the chief city of the government of the same name and the capital of Russian Caucasia, on the banks of the Kûr, 165 miles as the crow flies ESE. of the Black Sea. Since 1883 it has been connected by rail with Batoum on the Euxine and Baku on the Caspian, and is the chief centre of trade between Russia and Persia. The old city, which consisted of three distinct parts, and which traces its history as the capital of the Georgian princes back to the 5th century, has been greatly metamorphosed since the Russian occupation in 1795 and annexation in 1802. It is now divided into quarters assigned to the various nationalities, and possesses handsome public buildings, churches, schools, libraries, and observatories. In the middle ages the metal-workers of Tiflis were famous for their skill in engraving and inlaying, and their influence made itself felt in the brass-work of Venice; and to the present day the silversmiths and gunsmiths of the city maintain their character for excellence. Otherwise its manufactures (carpets and other textiles) are unimportant. In its neighbourhood are naphtha and thermal springs. The population in 1886 numbered 104,000, of whom about a third were Armenians.—For the *government*, see RUSSIA, and CAUCASUS; and see also GEORGIA.

Tiger (*Felis tigris*), a well-known feline Carnivore, belonging to the same genus as lion and leopard, lynx and cat, puma and jaguar. It seems most nearly related to the lion, from which it hardly differs except in superficial characters, such as the colour-striping and the absence of a mane, and in trivial skeletal features, especially of teeth and skull. In distribution the tiger is exclusively

Tiger (*Felis tigris*).
(From a Photograph by Gambier Bolton, F.Z.S.)

Asiatic, and has been found 'in almost all suitable localities south of a line drawn from the river Euphrates, passing along the southern shores of the Caspian and Sea of Aral by Lake Baikal to the Sea of Okhotsk. Its most northern range is the territory of the Amur, its most southern the islands of Sumatra, Java, and Bali. Westwards it reaches to Turkish Georgia, and eastwards to the island of Saghalien. It is absent, however, from the great elevated plateau of central Asia, nor does it inhabit Ceylon, Borneo, or the other islands of the Indo-Malayan Archipelago, except those above mentioned.' The tiger may exceed the lion in length. Adult males measure 5½ to 6½ feet from the nose to the root of the tail, and the tail measures about 3 feet. The females are rather smaller. Blandford gives authentic instances of

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tigers over 10 feet long (with the tail), and weighing nearly 500 lb. The predominant colour is bright rufous fawn or tawny yellow, and is barred by dark or black cross stripes; the under parts are whitish. In details the dark markings vary considerably. The favourite haunts of the tiger are grassy plains and jungle swamps, where its colour often harmonises most deceptively with that of the surroundings. The animal takes readily to the water and swims well; it can also, if circumstances press it, climb trees. Like other Felidæ, the tiger is a solitary hunter and stalks its prey stealthily till within the fit distance for making a final spring. It feeds on cattle, deer, wild hogs, pea-fowl, &c., and some old 'man-eaters' haunt the neighbourhood of villages on the outlook for human prey. 'The man-eater,' Mr G. P. Sanderson says, 'is often an old tiger (more frequently a tigress), or an animal that, through having been wounded or otherwise hurt, has been unable to procure its usual food. It is as cowardly as it is cunning, fleeing before an armed man, between whom and a possible victim it discriminates with wonderful sagacity.' Young tigers are said to glut their taste for blood far beyond the limits of hunger, and the same is true of the mother while the young are still her companions. Sir Joseph Fayrer reports that a tiger will in ordinary circumstances destroy one or two cows or buffaloes a week, refraining from fresh attacks until it has consumed the results of one night's work. In attacking a large animal, such as a bullock, the tiger seizes the nape of the neck with its teeth, holds the victim firm with its sharp claws, and with a powerful wrench dislocates the vertebræ. From two to six cubs are born at once, and these the tigress guards, feeds, and trains with all maternal care. They remain with her until nearly full grown, or about the second year. It is said that the male tigers are eager to destroy young male cubs; and apart from this occasional cannibalism is recorded. In some parts of the East tigers are numerous enough to endanger human life very seriously; and tiger-hunting is in these conditions 'a most noble sport.' In 1882 the population of a village in the south-west of the Bantam province was removed and transferred to an island off the coast in consequence of the trouble caused to the people by tigers. Baker regards the tiger as a more formidable and ferocious beast than the lion. In spite of the government rewards, lack of enterprise and a superfluity of superstition still afford the tigers a wide range in India. In the three years ending 1889, for instance, 546 people were killed by tigers in Central India alone, besides 6882 head of 'cattle' ('including asses and pigs').

See FELIDÆ; also W. H. Flower and R. Lydekker, *Study of Mammals* (1891); Sir J. Fayrer, *Royal Tiger of Bengal* (1875); W. T. Blanford, *Fauna of British India* (1888); St George Mivart, *The Cat* (1881); Elliot, *Monograph of the Felidæ* (1878–83); Sir Samuel Baker, *Wild Beasts and their Ways* (1890). For so-called tiger-cats, see MARGAY, OCELOT, and SERVAL. The jaguar is the *tigre* of South America. Tiger-wolf is a name given to the spotted hyæna and to the Thylacine. 'Tiger-moth' is any of the Arctiidæ (whose larvæ are 'woolly bears'); and 'tiger-beetle' is a Cicindella (q.v.).

Tiger-flower (*Tigridia*), a genus of plants of the natural order Iridaceæ. There are about seven known species, natives of Mexico, Peru, and Chili, all bulbous plants, generally treated as half-hardy or greenhouse plants. The flowers are few, enclosed in a spathe. The perianth has a short tube with a six-parted spreading limb; there are three stamens united in a cylinder, a three-celled ovary with a filiform style which has three filiform bifid stigmas. The best known of the species in British gardens is *T. pavonia*, which has been cultivated for nearly 100 years for the beauty of its rather evanescent flowers. The flowers are orange, spotted tiger-like, hence the name.

Tiger-lily. See LILY.

Tight-lacing. It has long been recognised that undue compression by the clothes, and particularly by stays, of the waist and lower part of the chest causes disturbance of the relations of the internal organs, and impairs their functions; producing, e.g., distortion of the liver and stomach, breathlessness, impaired digestion, and diminished capacity for exertion. More recently it has been maintained that the tendency to various more definite diseases is caused or much aggravated by this condition. Among these may be mentioned certain displacements of the womb, and other diseases peculiar to women; movable kidney, gall-stones, anæmia, and ulcer of the stomach, which are all more common in the female sex than the male. While it cannot be said that the causal relation is definitely established in any of these cases, there are facts in regard to each which render it at least possible that such a relation may exist.

In a case where an injurious effect of any kind is present or is suspected, it is not sufficient merely to discontinue the use of stays, for that would only bring the constricting bands by which the lower garments are usually supported to bear still more directly on the waist. Some arrangement must be made by which the weight of these garments may be borne by the shoulders and bust, either by having each one made with an upper part fitting the chest and shoulders, or by having them attached by buttons or tapes to a stout but not tightly-fitting bodice. It is much to be desired that more attention were paid to the natural conformation of the body, and less to the unreasonable demands of fashion, in the matter of dress.

Tigranes. See ARMENIA, MITHRIDATES.

Tigré, the northern division of Abyssinia (q.v.).

Tigris (Heb. *Hiddekel; Diklat* of the cuneiform inscriptions; *Tigrá* in Old Persian, 'swift as an arrow,' whence Gr. *Tigris;* Arab. *Dijleh*), a large river of Asiatic Turkey, rises south of Lake Goljik, in the mountains of Kurdistan, within a few miles of the eastern bend of the Euphrates (q.v.), flows south-east to Diarbekir, after which it makes a sharp turn and flows due east for 100 miles to Til. Here it receives from the north a considerable affluent, the Bitlis (united with the Bohtan Su), and once more altering its course runs in a south-easterly direction, mainly through desert wastes and unpeopled pastures, until it falls into the Persian Gulf, after a course estimated at 1150 miles. Its chief tributaries, beside the Bitlis, are the Great and Little Zab, and the Dyala, all from the left. At Kurna it joins the Euphrates, 90 miles above the mouth of that river in the Persian Gulf, and henceforth the united rivers bear the name of Shat-el-Arab (see EUPHRATES). In the upper part of its course the Tigris is a very swift stream, and it brings down great quantities of mud. The principal places on its banks are Diarbekir, Mosul, and Bagdad, with the ruins of Nineveh, Seleucia, and Ctesiphon. The river is navigable for small steamers to Bagdad, and for river-boats to near Mosul.—For the Bocca Tigris, see BOCA TIGRE, and CANTON.

Tilburg, a town of Holland, 14 miles ESE. of Breda, is an important railway junction, and has 300 manufactories of calico, cloth, leather, &c. Pop. (1871) 22,256; (1891) 34,492.

Tilbury Fort, in Essex, is situated on the north bank of the Thames, opposite Gravesend, and 22 miles E. of London. Originally erected in

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the time of Henry VIII. as a block-house, it was converted (1667) into a regular fortification after the bold expedition of De Ruyter into the Thames and Medway, and has been greatly strengthened since 1861. Here on 8th August 1588, more than a week after the dispersal of the Spanish Armada, Elizabeth reviewed her troops. The East and West India Dock Company constructed extensive docks at Tilbury in 1882–86 (see Vol. IV. p. 30).

Tilden, SAMUEL JONES, American statesman, was born the son of a farmer at New Lebanon, New York, 9th February 1814, studied at the University of New York, and was admitted to the bar in that city, and secured a large and important railway practice. By 1868 he had become the leader of the Democrats in the state, and he strengthened his position by the energy and determination with which he attacked and destroyed Tweed and his fellows (see TAMMANY). In 1874 he was elected governor of New York; in 1876 he was the Democratic candidate for the presidency (for the disputed election, see HAYES), and not only won general admiration, but possibly saved the excited country from something worse than fierce wrangling, by his temperate utterances and unselfish attitude. Twice afterwards his party would have nominated him had he been willing. He died 4th August 1886, leaving great part of his fortune of $6,000,000 to found and endow a free library in New York City. There is a Life by T. P. Cook (1876), and an edition of his writings and speeches by John Bigelow (2 vols. 1885).

Tiles, plates of baked clay, of various shapes and patterns, according to their use, some being for roofs, some for facing walls, and others for pavements. Marble and stone slabs used for covering roofs are also sometimes called tiles. Drain-tiles have been described under the head of PIPES. The small cubical pieces of burnt clay, stone, glass, or other material used for mosaic pavements are called tesseræ (see MOSAIC).

ENCAUSTIC TILES are ornamental tiles made of earthenware, and now extensively used for paving churches, halls, conservatories, &c. Strictly speaking, the name applies only to tiles with a pattern produced by layers of different coloured clays. By R. Prosser's process (patented in 1840) tiles of one colour are made of dried slip—i.e. the powder of carefully mixed and prepared clay. These are made by placing the coloured clay powder in strong steel moulds, and consolidating it in a semi-dry state, by means of a plunger fitting accurately into a mould worked by a screw-press. It is then removed, heated in a hot chamber, fired, and glazed if required.

Encaustic tiles are made by two quite different processes. By the older of these, which is a revival of that used in mediæval times, the clay is worked in a plastic state first into square blocks. These are cut into square slices or slabs by passing a wire through them; upon a slab so cut is put a facing of fine clay of the colour of the ground of the pattern—another layer of fine clay being added to the bottom to prevent warping. By means of metal containing-frames, fitting into each other, a plaster of Paris mould or reverse is pressed with a screw-press into the face of the soft tile, and thus indents the pattern. Clay of the requisite colour to form the pattern is now poured in a semi-fluid state into this depression, the tile being then set aside until dry enough to have its surface scraped. By this means the superfluous clay is removed, and the pattern is brought out clear and well defined, the two or more colours of clay forming one smooth flat surface. The tile is then dried and fired.

The other process of making encaustic tiles is by the use of perforated brass plates and a screw-press, clay powder or 'dust,' prepared in the same way as in Prosser's method, being used. It was patented by Boulton and Worthington in 1863, and is extensively used. By this process the device on the tile is first made by pressing clay dust into the perforations of a brass plate laid on a metal block; or if it is of more than one tint, then dust of two or more colours, with as many brass plates, is used to build up the pattern. The plates being removed, the clay powder which is to form the body of the tile is then filled into a mould round the device, and the whole consolidated by pressure.

Encaustic tiles were used for paving churches in the north of Europe from the 12th to the 16th century; but in Spain and Italy the mediæval and later paving-tiles had their patterns produced in thick enamel glaze on the surface, and were not so durable as when made with two or more layers of different coloured clays.

WALL TILES of a highly decorative character were made at least as early as the 12th century in Persia, and it is very probable for a long time before that. The manufacture was continued into the 17th century before the artistic merit of the designs declined. Many, if not most, of the earlier of these mural tiles have designs of a very effective but simple kind painted in enamel glazes of a coppery or dull golden colour, with sometimes a little blue or other tint added, the whole surface having a quiet but pleasing lustre. Others, perhaps a little later in date, while retaining some of this flat coppery painting, have in addition bold ornament and inscriptions in relief, which are further picked out from the light ground by deep blue or greenish-blue colour. The tiles of this class were of larger size, and were used for dadoes, large panels, and cornices or friezes, or a combination of both. They have generally a brilliant lustre, which varies their effect when viewed at different angles. Very beautiful wall tiles without lustre and with ornament somewhat different from the above, but still retaining a Persian character, were made at Damascus, Rhodes, and perhaps other places in the 16th century. The mosques of Damascus and other towns in Asiatic Turkey, as well as those of Cairo, and buildings in Moorish Spain, contain splendid examples of wall-tile decoration; while the mosques in some of the older towns in Persia are similarly decorated with tiles which are distinctly Persian. Coloured tiles are also employed for covering the domes and towers of some churches in Spanish America (see, e.g., MONTEVIDEO).

For coloured representations of these mural tiles, see P. D'Avennes, *L'Art Arabe* (1877), and H. Wallis, *Persian Ceramic Art* (Godman collection, 1891); also PERSIA, p. 70; and C. T. Davies, *The Manufacture of Bricks, Tiles, Terra Cotta, &c.* (new ed. 1889).

Tiliaceæ, a natural order of exogenous trees and shrubs, or rarely herbaceous plants, mostly natives of the tropics, though a few are found in the temperate parts of the northern hemisphere. They have simple, alternate leaves, with stipules and axillary flowers. As the characters somewhat correspond with those of Malvaceæ, so do the properties of the order, which are generally mucilaginous and wholesome, the bark fibrous. There are about 46 genera and 330 species. Some yield a light and useful timber, as the Lime (q.v.) or Linden tree. The *bast* of the lime-tree is valuable from its fibrous character; various Indian and American species are useful on this account, but the most important fibrous plants of the order are the species of Corchorus, which yield Jute (q.v.).

Till. See BOULDER-CLAY, PLEISTOCENE.

Tillandsia. See BROMELIACEÆ.

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Tillemont, Louis Sébastien le Nain de, ecclesiastical historian, was born in Paris, 30th November 1637, had his education from the Port-Royalists, and early devoted himself to historical studies. He entered the priesthood in 1676, and after the dispersion of the Solitaires in 1679 spent most of the remainder of his life on his estate at Tillemont near Paris. Here he died, 10th January 1698. His chief works are the laborious and solid *Mémoires pour servir à l'Histoire Ecclésiastique des Six Premiers Siècles* (16 vols. 1693–1712) and the *Histoire des Empereurs qui ont régné durant le Six Premiers Siècles de l'Église* (6 vols. 1691–1738).

Tillicoultry, a manufacturing town of Clackmannanshire, at the base of the Ochils and near the right bank of the Devon, 10 miles ENE. of Stirling and 4 NNE. of Alloa. Woollens have been manufactured here since the 16th century, and since 1824 also shawls and tartans, tweeds and silk fabrics. Pop. (1851) 3217; (1891) 3939.

Tillodonts. See Eocene System.

Tillotson, John Robert, Archbishop of Canterbury, was born the son of a Puritan clothier, at Sowerby in Yorkshire, in October 1630. He studied at Clare Hall, Cambridge, graduated B.A. in 1650, and became a fellow the year after. The writings of Chillingworth influenced him early, not less the conversation of Cudworth, and others of his school. In 1656 he became tutor in the house of Edmund Prideaux, Attorney-general under the Protector. He is said to have received his orders from Sydserf, Bishop of Galloway, and at any rate he was a preacher by 1661, when we find him ranged among the Presbyterians at the Savoy Conference. He submitted at once to the Act of Uniformity (1662), in December of the same year declined Calamy's church of St Mary Aldermanbury, London; but in 1663 became rector of Keddington in Suffolk, the year after preacher at Lincoln's Inn, where his mild, evangelical, but *un*doctrinal morality was at first little relished—'Since Mr Tillotson came,' said the Benchers, 'Jesus Christ has not been preached among us.' That same year he married a niece of Oliver Cromwell, and became lecturer at St Lawrence's Church in the Jewry. In 1670 he became a prebendary, in 1672 dean, of Canterbury. Along with Burnet he attended Lord Russell on the scaffold (1683). In 1689 he was appointed Clerk of the Closet to King William and dean of St Paul's, and in April 1691 was raised to the see of Canterbury, vacant by the deposition of the Nonjuror Sancroft. He accepted this elevation with the greatest reluctance, nor could all the insults of the Nonjurors to the end of his life extort either complaint or retaliation from the meek and tolerant primate. He died of palsy, 22d November 1694. His *Posthumous Sermons*, edited by his chaplain, Dr Ralph Barker, filled 14 volumes (1694), and for them the booksellers gave the unwonted sum of 2500 guineas. A complete edition of his whole works, including 254 sermons, appeared in 3 vols. folio, 1707–12; with a good Life by Dr Thomas Birch, 1752; and an annotated selection of his sermons by G. W. Weldon (1886). The judgment of Tillotson's preaching by his contemporaries is thus summed up by Burnet: 'He was not only the best preacher of the age, but seemed to have brought preaching to perfection; his sermons were so well heard and liked, and so much read, that all the nation proposed him as a pattern, and studied to copy after him.' Dryden used to say that what talent he had for English prose was due to his familiarity with Tillotson, and Locke recommends him as a model of perspicuity and propriety in language.

Tilly, Johann Tserklaes, Count of, a famous general of the Thirty Years' War, was born in 1559, at the castle of Tilly in Brabant. Educated by the Jesuits, he learned the art of war in the Spanish service under Parma, next fought in Hungary against the Turks, and was appointed in 1610 by Duke Maximilian of Bavaria to reorganise his army. He was given the command of the Catholic army at the outbreak of the Thirty Years' War, and in conjunction with Duke Maximilian gained (8th November 1620) the battle of Prague, which dissipated the ambitious dreams of the Elector-Palatine. During the course of this war he separated, by able strategy, the armies of Mansfeld and of the Margrave of Baden, beat the latter at Wimpfen (6th May 1622), expelled Christian of Brunswick from the Palatinate, defeating him at Höchst (20th June 1622) and at the desperate struggle at Stadtlohn (6th August 1623). Created a count of the empire, he next defeated the king of Denmark at Lutter (27th August 1626), and in conjunction with Wallenstein compelled him to sign the shameful treaty of Lübeck (1629). Next year he succeeded Wallenstein as commander-in-chief of the imperial forces, and took by storm the town of Magdeburg (q.v.; 20th May 1631). The unheard-of atrocities which he allowed the Croats and Walloons of his army to perpetrate on this occasion have cast a foul stain upon his reputation not to be blotted out. From this time fortune deserted him, for his next opponent was the great Gustavus Adolphus, who completely routed him at Breitenfeld (17th September 1631); and, though in the following spring he obtained a slight success over the Swedish general Horn, the king speedily forced him to retreat behind the Lech in Bavaria, and (5th April) forced the passage of the river right in his front, after a desperate conflict, in which Tilly received his death-wound. He was carried to Ingolstadt, where he died, 20th April 1632. Tilly was small and meagre, with fierce eyes and a stern countenance, sober and continent, a despiser of luxury and wealth. His zealous support of the Catholic party was entirely founded upon fanatical zeal for the supremacy of a religion which he regarded with more than monkish devotion.

Til-seed. See Sesame.

Tilsit, a town of the province of East Prussia, on the left bank of the Memel or Niemen, 65 miles NE. of Königsberg by rail, with some miscellaneous manufactures, and an active trade in timber, corn, hemp, flax, butter, &c. Here was signed, on an island in the river, the treaty of 1807 between Alexander I. of Russia and Napoleon. It marked Prussia's humiliation after the battles of Eylau and Friedland, and took away (till 1815) half of her territory (see Napoleon). Pop. (1885) 22,422.

Timber. The number of different woods which might be useful to man is very great. In the United States there are more than 300 species of trees the smallest of which grows to a height of 30 feet. In South America the number is much greater, and India possesses about 900 species of timber-trees. The species in England do not exceed thirty, and in France or Germany there are only a few more. Yet, though the kinds of wood are so much more limited in European countries, there are almost as few in general use in the United States as in Europe. The smallness of the number of species of timber known to commerce is at first glance very remarkable, but it is accounted for in this way. The great consumpt of timber is for architectural and other constructive works which are usually carried out on a scale of some magnitude, and for such purposes large quantities of the kind or kinds chosen are required. It is very desirable, therefore, that the wood selected should be plentiful, durable, more or less easily worked, fairly uniform

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in quality, and moderate in price. As yet the very useful timbers have been obtained from gregarious species of trees growing in the forests of the north temperate regions of the globe, and the most important of these are a few kinds of fir and pine. From the tropics, where the social species are fewer, come the harder, heavier, and more richly coloured or figured kinds, some of which are used in Europe and North America only for furniture and decorative purposes. Some of these tropical woods are, however, of extraordinary strength, and possess other valuable properties which will bring them sooner or later into use for building purposes. This is all the more certain to be the case as both in North America and in Europe the forest-covered land is being stripped of its best timber at a rapidly increasing rate. Trees are of such slow growth that it takes many years before they are large enough to yield useful timber; so that when the primitive forests of a country are once cut down the keeping up of a supply by planted trees is a very difficult matter.

Chief Commercial Timbers.—The following are the best known and most used timbers in Great Britain. Baltic Redwood (*Pinus sylvestris*), perhaps the most generally useful of all, is employed for roofing and flooring, and often for all other internal and external wood-work of better-class houses and other buildings. It is also used for paving streets and many other purposes. This wood in the cut state is called 'yellow deal' in England. American Yellow Pine (*Pinus strobus*), called white pine in its native country, is also very largely imported for the internal joiner-work of buildings, parts of furniture, &c., but it is not suited for external work. Like the last, it is an excellent and easily worked timber. Baltic White-wood (*Abies excelsa*) has for a considerable number of years taken the place of redwood for joists, flooring-boards, roof-timbers, &c. It is a distinctly inferior wood. American Pitch Pine (*Pinus rigida*), found over a large extent of country in the eastern states, is an important timber. It has been much used in England for open roofs and for the whole of the wood-fittings of churches, halls, and the like. The annual rings of this wood are strongly marked, so that its planed surface looks striped. It can be got of large scantling, and is a heavy and highly resinous, but not very easily worked wood. The Douglas or Oregon Pine (*A. Douglasii* or *Pseudotsuga Douglasii*) of North-western America, between 200 and 300 feet in height, yields a timber of great length without knots, suitable for masts, spars, and many other purposes. Under the name of Californian Redwood, the timber of *Sequoia sempervirens* has of late years been to some extent imported into Great Britain. Like the last, the tree is of great size, and the wood is easily got free of knots. It is of a pleasing red colour (most of the so-called red pine-woods are nearly white), and easily worked in the longitudinal direction, but difficult to cut clean across the grain. Another recently imported wood is the Kauri Pine of New Zealand. The Kauri (*Dammara australis*) is also a majestic tree, and the wood is highly prized for all general purposes in its native country. It seems to have some tendency to warp, but this may be owing to defective seasoning. We may mention among coniferous woods that of the Deodar (*Cedrus Deodara*), which, although not used in Great Britain, is extremely durable, and of great importance in Northern India.

Among the more important American coniferous timbers, some of which have been already referred to, are the White Pine (*Pinus strobus*), called in England yellow pine; the Yellow Pine of the eastern states (*Pinus mitis*); the Hemlock; the Black Spruce; the Douglas Pine; Californian Redwood; the White Cedar (*Chamæcyparis thyoides*); the Red Cedar (*Juniperus virginiana*); and the Larch or Tamarack (*Larix americana*). See CEDAR, SEQUOIA, FIR, and PINE.

Of timbers from dicotyledonous or, as they are sometimes called, foliaceous trees oak is the most important. The oak timber grown in the north of Europe is obtained from two or three varieties of one species of Quercus, or from distinct but closely allied species (see OAK). The timber possesses in a high degree the useful properties of a hardwood. It is strong, tough, elastic, and not too heavy. Its specific gravity averages about ·800. Few woods are more durable or less affected in exposed situations by alternations of wet and dry weather. It is still used largely in shipbuilding and for many purposes in civil architecture, but for the latter it is much more expensive than pine-wood. Oak has the defect of rusting iron which pierces it or which is in contact with it. One or two American oaks also yield valuable timber. Teak (q.v.), from an Indian tree, is next in importance to oak as a constructive timber. It has just the opposite effect upon iron, as it protects the metal from rust, a property which gives it great value as a backing for the armour-plating of ships. Teak is neither quite so hard nor so strong as oak, but it is as difficult to cut with tools, and it is rather lighter when thoroughly seasoned. Besides its extensive use in shipbuilding, it has been of late years used for external architectural work. Elm (q.v.), though of much less consequence than oak as building timber, is nevertheless a good deal employed for engineering purposes; it is also used in shipbuilding for keels and other parts under water. Elm is only of great durability if kept either quite dry or constantly wet. For other timbers belonging to the same great class of trees, such as ash, beech, hornbeam, sycamore, lime, and birch, which have more restricted applications, see their respective heads. In the south of Europe the timbers of the Chestnut (*Castanea vesca*) and the Walnut are extensively used.

There are a few exceptionally remarkable timbers, which may just be named. Greenheart (q.v.), which is of extraordinary strength, is believed to contain some principle which resists the attacks of boring-worms when used for piles. Sabicu (*Lysiloma sabicu*), which is plentiful in Cuba, is another immensely strong wood. Both these timbers are heavier than water, and are used in shipbuilding. The Jarrah Wood (*Eucalyptus marginata*) of Western Australia is believed to be extremely durable for sleepers and paving blocks. Recently a few of the streets of London have been paved with it. Lignum Vitæ (*Guaiacum officinale*; see GUAIACUM) is of all woods the one which comes nearest to a strong metal in resistance to tear and wear.

Furniture and Ornamental Woods.—Mahogany (q.v.) is by far the most important of furniture-woods, and it has many minor applications as well. Perhaps no other timber has such valuable properties for the construction of cabinets, sideboards, tables, or casing of any sort. For a hardwood it is easily worked; it is close-grained, takes a fine polish, and is very durable; if well seasoned it is not apt to warp, shrink, or crack, and its colour improves with age. Some pieces of finely 'curled' or figured mahogany bring a very high price. Oak, though also an excellent wood for furniture, is more difficult to season, more laborious to work, and less easy to obtain free of defects. The Black Walnut (*Juglans nigra*) of Canada and the United States is much used for furniture. It is of a pleasing dark colour, and comes near Spanish mahogany in suitability for cabinet work, but it is not so hard. Italian or Circassian Walnut (*Juglans regia*)

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is harder, and as a rule much more richly figured. It has been used for centuries for carving and furniture in Italy and other European countries. Much old walnut furniture is badly 'worm eaten.' Brazilian Rosewood (see ROSEWOOD), the product of a much smaller tree than any of the above, is a strong, hard, heavy material, but fairly easily worked. It is of a dark, rich brown colour, with beautiful streaks and cloud-like markings of a still darker tint, which more nearly resemble those of a coloured marble than any other known wood. It has been long used in Europe for costly furniture. Satinwood (q.v.), of which there are two kinds much the same in appearance, is something like rosewood in hardness and fineness of grain. Owing to their closeness of grain neither holds glue well. Except that it is of a different and much lighter colour, the figure of satinwood much resembles the 'curl' of mahogany. Ebony (q.v.) is another of the costly cabinet woods which is also hard and heavy. It is particularly close in the grain, so that it is suitable for drawing instruments as well as for cabinets, caskets, and the like. Ebony is black or nearly black in colour, and has been prized for making furniture with ivory and other 'inlays' from ancient Egyptian times. Beautiful work of this kind is still made in Paris. The strikingly mottled Calamander Wood of Ceylon and the fine Marble-wood of the Andaman Islands are both from ebenaceous trees. Among the very beautiful and for the most part costly woods used only for veneering and inlaying furniture and small ornamental articles are Tulip-wood (*Physocalymma florida*), Snake or Letter Wood (*Brosinum aubletii*), Purple Heart (*Copaifera Martii*), and Zebra-wood (*Connarus guianensis*) from the tropical parts of America; to which may be added Amboyna Wood from Singapore. *Bird's-eye Maple*, a beautifully spotted or 'eyed' light wood, is used in its native country (North America) for furniture, and was formerly much in favour for this purpose in England (see MAPLE). In the south of Europe the wood of the olive and of the orange are used for cabinet work. In Australia some species of Acacia, such as Black-wood (*A. melanoxylon*) and Myall-wood (*A. homalophylla*), which are dark woods, the former, especially, often beautifully figured, are used for furniture; so also are several other woods, including Forest Oak (*Casuarina torulosa*), Muskwood (*Olearia argophylla*), and Cypress Pine (*Frenela robusta*), a Queensland tree. Of late years, under the name of African Mahogany, the botanical source of which is still uncertain, a wood somewhat resembling ordinary mahogany has been imported in some quantity into England from the coast of Guinea, and seems to be coming into favour for some kinds of cabinet work.

Nature of Wood.—The stem or trunk of an ordinary exogenous tree consists of a central pith and rings or zones of fibro-vascular bundles (composed of numerous cell forms) through which medullary rays radiate (see STEM). In a growing tree of this class the new wood forms next the bark, and is called sap-wood (alburnum). Gradual changes occur in these annual rings or layers of new wood as they become older, and in time, which varies from one to many years, they get hardened or solidified into ripe-wood or heart-wood (duramen), of which all useful timber consists. These changes are of a chemical and physical character, and, although it is the hardening of the wood of a growing tree with age that gives it its technical value, yet the change is, physiologically, an incipient process of degradation which ends in decomposition. It is only in a few kinds of trees, however, that the decay of the wood is rapid. This duramen or heart-wood, when properly treated after felling, is generally of a lasting nature, and in the hardwoods especially is usually of a darker colour than the sap-wood; but in some pine-woods the sap-wood, soon after the tree is cut down, gets darker than the heart-wood, and is of a bluish or greenish colour.

The properties of wood depend partly upon the mode of union of the fibres, and partly upon the constituents, such as gum, resin, tannic acid, &c., which occur in the cellular and intercellular spaces. But there is also a small proportion of nitrogenous constituents which set up a kind of fermentation in damp wood, and especially in young spongy wood, exposed to the air, and are the cause of its decay. In other circumstances, however, even in the presence of moisture, but where the access of oxygen is prevented, some kinds of wood will keep for an enormous length of time. Pieces of wood have been taken out of the lignite beds of the newer geological formations which are scarcely distinguishable from sound timber recently cut. The timber used in the construction of a house or other building should be thoroughly dried before being put in, and air allowed to circulate about it. This is especially necessary with regard to joists and flooring near the surface of the ground, otherwise damp and want of ventilation will render them peculiarly liable to be attacked by Dry Rot (q.v.).

The apparent specific gravity of wood varies from 0·383 (poplar wood) to 1·333 (lignum vitæ), and perhaps some kinds are even denser. But the sawdust of nearly all woods is heavier than water, and the actual specific gravity (i.e. of the wood apart from enclosed air) is much the same in all. The quality and the apparent specific gravity of timber from the same species of tree often widely vary. Soil, climate, whether they grow in close proximity, and other conditions determine to a large extent the value of wood from trees of a like kind. For example, the timber of the Scotch fir (*Pinus sylvestris*) brought from the Baltic varies so much that the Swedish wood is only two-thirds the price of that which comes from Danzig, while the wood of the same tree grown in Scotland is of less value than either. With mahogany the qualities differ far more. Spanish or Cuba mahogany is of much greater value than, and sometimes twice as heavy as, Honduras or Bay mahogany from the same species of tree. Each of these varieties again is found to differ greatly in quality in different samples of the wood.

Seasoning of Timber.—Trees, and especially deciduous trees, should always be felled in winter, as in that season they contain the least amount of natural sap. They should not be allowed to remain long upon the ground where they are cut down, but, as soon as possible, the logs ought to be stacked with packing pieces between them, to allow the sap freely to evaporate. They should also be covered in from the weather. When the logs are cut up into planks or boards these are usually in the first place laid horizontally, with laths or fillets between them, and allowed to remain in this position for six months completely protected from rain. Afterwards they are placed for the same length of time in a vertical position on racks, and kept a little apart. Most ordinary woods require this length of time to season them properly in a natural way, although some are ready for use sooner than others. The seasoning of timber can be hastened by steaming or boiling it, or, in the case of planks and thin cut wood, by placing it in hot air chambers. Natural seasoning is, however, by far the best. For cabinet work and the better kinds of joinery the naturally seasoned wood is, just before being used, usually put for a week or ten days in a stove heated to about 120° F. The thorough seasoning of wood

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is of great importance, but too frequently is only partially effected.

Preservation of Timber.—For the external woodwork of buildings oil-paint is usually employed, and the painting should be renewed every four or five years. Wooden ships and boats are coated with tar or pitch. But for such purposes as pavement, sleepers, piles, &c. treatment with certain chemicals which penetrate the wood more deeply has been proposed. Three methods of doing this have been chiefly tried, and of these the impregnation with bichloride of mercury is called Kyanising (q.v.); when sulphate of zinc is used the process is termed burnettising; and the third method—the only one extensively practised in Great Britain—is creasoting. The latter consists in steeping the wood in creasote oil, from 8 to 12 lb. being required for every cubic foot of timber. Since 1882 a new process introduced by Mr H. Aitken of Falkirk has been under trial—namely, the soaking of timber, according to its bulk, from two to twelve hours in melted naphthaline. This is a volatile substance, which must so far be against its efficiency, but the results of the experiments are said to give good promise of success.

The following statement gives the imports of timber into Great Britain for the year 1890: Fir (all coniferous wood), 6,530,165 loads, value £13,891,144; oak, 142,154 loads, value £809,893; teak, 60,182 loads, value £680,162; unenumerated, including staves, 480,349 loads, value £1,385,797; furniture and hardwoods, 122,361 loads, value £994,766: grand total, 7,335,211 loads, value £17,761,762.

The exports of wood and its manufactures from the United States in 1890 reached $28,255,745; this includes all kinds of lumber, timber, furniture, &c., but not firewood. The annual lumber product of the United States may be set down at nearly $700,000,000, and the manufacture (in some 25,000 mills, employing 150,000 hands) at $230,000,000. The principal lumber-producing region is now that of Michigan, Wisconsin, and Minnesota; but here, as in the older states, the forests are being rapidly and ruinously depleted, and ere long the United States will be compelled to fall back for its chief lumber supply upon the Pacific and Gulf states. The articles CANADA, NORWAY, &c. may also be consulted.

See ARBORICULTURE, BARK, BAST, WOOD, BORERS, BORING ANIMALS; Laslett, *Timber and Timber Trees* (1875); Gamble, *Manual of Indian Timbers* (1881); W. Stevenson, *The Trees of Commerce* (1888); Marshall Ward, *Timber and some of its Diseases* (1889); Hartig, *Timbers, and how to Know Them* (Eng. trans. 1890); Schlich, *Manual of Forestry* (1891).

Timbrel (Spanish *tamburil*), a small musical instrument, in use in ancient times, notably by Miriam after the passage of the Red Sea, which was carried in the hand, and was apparently quite similar to the modern Tambourine (q.v.).

Timbuctoo (native *Tumbutu*, Arab. *Tinbukhtu*), a famous city of the Soudan, on the southern edge of the Sahara, lies about 8 miles north of the main stream of the Joliba or Upper Niger. It stands only a few feet above the level of the river, is about 3 miles in circumference, and at present without walls, though in former times it covered a much greater area, and was defended by walls. The houses are mainly one-story mud-hovels, but one of the three chief mosques is a large and imposing building, dating from 1325. The place stands on an important trade route between the interior and the west and south; and its importance has increased through the gradual extension of French influence hither (see SENEGAMBIA). Articles of trade are gold-dust, salt, kola-nuts, ivory, gums, ostrich-feathers, dates, and tobacco, exchanged for Manchester goods, mirrors, knives, tea, coral, &c. The town stands on the borders of various tribes and kingdoms—Sonrhai, Berbers, Tuaregs, Fulahs, Mandingoes, &c.; and amongst the 20,000 inhabitants of the place all these races are represented, with Arabs, Arabised Africans, and Jews. Timbuctoo was apparently founded in the 11th century, and first became known to Europeans in the 14th (Ibn Batuta was here about 1350); it has been visited by but six or seven Europeans, including Lenz in 1880. Timbuctoo has been besung by Tennyson and Thackeray. See SAHARA.

Time. Any periodic phenomenon which we have reason to believe is steadily rhythmic is useful for measuring time. The earth's axial rotation in presence of the sun is the particular phenomenon by which time is measured everywhere on the earth's surface (see DAY). Experiment and observation show that, if we assume the earth to rotate uniformly, there are many other phenomena which are as accurately isochronous in their periodicity. That is to say they pass again and again through all their phases in exactly the same interval of time as measured in terms of the earth's time of rotation. In the pendulum of a clock and the balance-wheel of a watch we have such isochronism very approximately realised (see HOROLOGY). A little consideration will convince us that the measurement of time is really a comparison of periodic sequences. We cannot conceive any other mode of marking off time intervals than by some kind of motion of a periodic character. Our practical unit of time is essentially terrestrial. We may, however, measure time in terms of a unit which could be as easily defined anywhere in known space as on the surface of our earth. The periodic time of a particular ray of light emitted by a universally distributed substance like hydrogen would be such a cosmic unit.

It has been long the custom among civilised races to divide the day into twenty-four hours, or rather into two sets of twelve hours, mean solar time (see DAY). Twelve o'clock noon corresponds to the meridian passage of the *mean* sun; and each day begins at twelve midnight. Now as we pass westwards the instant at which the sun crosses the meridian occurs later and later, as measured on a clock keeping, say, Greenwich time. That is, the noons at two places not situated on the same longitude line occur at different instants. Thus London and Dublin have different local times, the Dublin noon falling 25 min. 22 sec. later than the London (or Greenwich) noon. Similar differences exist for other parts of the United Kingdom, but within recent years, because of the development of rapid intercommunication by rail and steam, Greenwich time has gradually been adopted throughout Great Britain, and local times have practically ceased to exist. Similarly France has adopted Paris time as the civil time for the whole country.

Following the example of the United States, all countries are gradually adopting Standard Time. By this is meant time which differs from Greenwich mean time by whole hours. The globe is divided into zones of 15° or one hour breadth, the Greenwich meridian being in the centre of the zero zone. Thus Belgium and Holland keep Greenwich time; Denmark, Sweden, Switzerland, Austria, and Germany (Prussia temporarily excepted) keep the time of longitude 15° E.—i.e. one hour earlier than Greenwich. In North America again five zones are distinguished. Halifax falls within the time zone of 60° W. long. or four hours later than Greenwich; Montreal and New York fall within the zone of 75° or five hours west of Greenwich; and so on across the entire continent. New York, Chicago, Denver, and San Francisco may be mentioned as places whose times

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change by one hour as we pass from one to the next succeeding. The corresponding times are distinguished as Eastern (67½—82½°), Central (82½—97½°), Mountain (97½—112½°), and Pacific (112½—127½°) times. Standard time in Japan is nine hours earlier than Greenwich time.

In the western parts of Canada the twenty-four-hour system has been adopted, under which four P.M. becomes sixteen o'clock, and so on. Steps are being taken to introduce it generally in India, Belgium, and the United States. It is of special convenience in the construction of railway time-tables; and it has the further claim that it has long been used by the Italians and by astronomers. The system of universal time, in which all places would keep Greenwich time, has a growing number of advocates. The adoption of such a system would be a little awkward at first to all who have got to think of twelve o'clock as being necessarily either noon or midnight; but a little experience would correct this.

Time is earlier or later than Greenwich according as the locality is east or west of Greenwich. Thus places lying close together but on different sides of the longitude line of 180° differ nominally by a whole day in time. Sunday at the one place occurs simultaneously with Monday at the other. A vessel sailing eastwards across the Pacific has two consecutive days of the same name as it crosses the critical meridian, or in other words has one day of nearly 48 hours' length. On the other hand, a vessel sailing westwards in the same longitude drops a day. Until a few years ago the Philippine Islanders held their Sunday on the day which was Monday to the inhabitants of Borneo. This arose from the historic fact that the Philippines were discovered by the Spanish voyagers coming from the east round Cape Horn; whereas Borneo was discovered by the Portuguese coming from the west. The matter is put most simply thus: To the eastward-bound traveller sunrises come at shorter intervals than to the stationary observer, while to the westward-bound traveller they come at longer intervals. Thus after one complete circuit the former traveller has experienced one sunrise more, and the latter one sunrise less, than has the stationary observer in the same lapse of time.

For sidereal time, see DAY; see also the articles on Astronomy, Calendar, Chronology, Clepsydra, Dial, Hour, Hour-glass, Latitude and Longitude, Month, Period, Seasons, Year. For the philosophical theories of time, see PSYCHOLOGY, Vol. VIII. p. 475. When it is twelve o'clock noon, Greenwich mean time, the hour (local time) at various important places on the globe is as follows:

Auckland, N.Z.	11 h. 39 m.	P.M.	New York	7 h. 4 m.	A.M.
Bombay	4 51	P.M.	Paris	0 9	P.M.
Calcutta	5 53	P.M.	Peking	7 46	P.M.
Cape Town	1 14	P.M.	Quebec	7 15	A.M.
Dublin	11 35	A.M.	St Petersburg	2 1	P.M.
Edinburgh	11 47	A.M.	San Francisco	4 23	A.M.
Melbourne	9 40	P.M.	Sydney	10 5	P.M.

Times, THE, is a London daily paper, frequently spoken of as the leading journal of the world. It was established in 1788 (see NEWSPAPERS). The founder, Mr John Walter (1739–1812), was not a printer or journalist by profession, but an underwriter at Lloyd's who had made a fortune and lost it in consequence of the capture by a French squadron of a fleet of merchantmen on which he had taken a large risk. In 1803 the management of the paper was transferred to Mr John Walter (1784–1847), the son of the founder, a man of exceptional talent, energy, and enterprise. He refused to accept the foreign news offered him by the government, and organised a system by which intelligence from abroad was more correctly reported and more rapidly transmitted to London than it ever previously had been. The capitulation of Flushing, the victory of Waterloo, and many other important events were made known to the English public before the arrival of government despatches. The *Times* earned a high reputation for independence by the opposition it offered to the ministry of Pitt. Mr Walter, after overcoming difficulties which would have disheartened most men, succeeded in 1814 in printing the *Times* by steam, a most important event in the history of printing (see Vol. VIII. p. 411). In 1816 Mr Thomas Barnes (1785–1841) became editor. As a leader-writer he was assisted by Mr John Sterling, 'the thunderer.' Mr Barnes's successor was Mr John T. Delane (q.v., 1817–79), then a young man fresh from Oxford. The new editor wrote no articles, but he read all important matter printed for publication; and one of his chief tasks during the thirty-six years of his editorship was to make the leaders of able specialists reflect the ideas, tone, and language of the best London society. It was he chiefly who obtained for the *Times* leaders the reputation of being models of English style. In 1847 Mr John Walter (born 1818), third of the name, for twelve years member for Nottingham, and then from 1859 till 1885 for Berks, succeeded his father as proprietor. He inherited the enterprising spirit of his family. In his time the railway and electric telegraph revolutionised newspaper management, and no journal so rapidly and successfully adapted itself to the new conditions as the *Times*. The most prominent assistant of Mr Walter in this work was Mr John Macdonald (1822–89), for many years manager of the paper. He combined literary ability, business experience, and great administrative capacity with high inventive talent as a mechanical engineer. Under his able guidance, and at enormous expense, experiments were conducted which brought to perfection in 1860 the art of printing from stereotypes, and in 1869 'the Walter press' (see Vol. VIII. p. 412). In many ways the *Times* has won the confidence of the mercantile public. In 1841 it was the means of detecting a conspiracy by which London bankers would have been defrauded to the amount of one million sterling, but it had in consequence to defend an action at law. The merchants and bankers of London raised a sum to pay the costs, which, on their offer being declined by Mr Walter, was employed to found two scholarships at Oxford and Cambridge, and to erect two tablets recording the facts, one in the *Times* office, and the other in the Royal Exchange. The chief event in the recent history of the paper was the 'Parnellism and Crime' articles (see Vol. VII. p. 780). Mr Delane was succeeded as editor by Professor Thomas Chenery (1826–84), and under him and his successor, Mr George Earle Buckle, the *Times* has maintained its reputation as the leading newspaper. The telegraphic foreign news, necessarily ephemeral, has been supplemented by well-digested articles, yearly summaries, notices of the best English and foreign books, &c. These, with tables of contents appearing in each number, and an index published separately (since 1867), now make a file of the *Times* one of the best and most accessible books of reference.

See *Times* Centenary in *Times* of 1st January 1888, and Chambers's *Book of Days* (vols. i. and ii.).

Time-tables. See BRADSHAW'S RAILWAY GUIDE.

Timoleon, liberator of Sicily, belonged to a noble family of Corinth, and was born there in the later half of the 4th century B.C. So ardent was his love of liberty that, if he did not himself slay his brother Timophanes, he saw him slain without dissatisfaction, for attempting to enslave the state. In 344 he was sent to Sicily at the prayer of the

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Greek cities there to save their liberties and repel the Carthaginians. He landed at Tauromenium, overthrew Hicetas, tyrant of Leontini, who was striving to drive Dionysius out of Syracuse, and by 343 had possession of Syracuse itself. Hicetas now induced the Carthaginians to send a huge army into the island, but Timoleon marched to meet them with 12,000 men, and routed them though seven to one on the river Crimissus (339), the gods themselves showing him signal favour by driving a blinding hail-storm right into the faces of the enemy. The Carthaginians were now fain to make a treaty by which they confined themselves to the west of the Halycus. He next drove out all the tyrants, and restored their freedom to the Greek cities of Sicily, then settled quietly as a private citizen in Syracuse, enjoying the love and admiration of the whole Greek world until his death in 337. Holm, the German historian, calls Timoleon the Garibaldi of antiquity; and the comparison does justice to his daring, his honesty of purpose, and his force of character, hardly to his wisdom and political foresight. His story was written by two contemporary writers, Timæus and Theopompus, who supplied the materials alike to the extant works of Diodorus Siculus and Plutarch. The latter's life is one of his masterpieces. An excellent edition is that by Dr Holden (Camb. 1889).

Timon, the misanthrope, was a native of Athens, and a contemporary of Socrates. The little that is known concerning him is learned chiefly from Aristophanes and the other comic writers who attacked him. Disgusted with mankind on account of the ingratitude of his early friends and companions, he lived a life of almost total seclusion from society, his only visitor being Alcibiades. Lucian made him the subject of a dialogue; but his name survives best in Shakespeare's play, the basis of which was the version of the story given in Painter's *Palace of Pleasure*.

This Timon must be distinguished from Timon the *Sillographer*, a Greek poet and philosopher, who was a scholar of Pyrrho, flourished about 280 B.C., lectured at Chalcedon, and spent his latest years at Athens. There are extant some fragments of his *Silloi*, a series of sarcastic hexameters upon Greek philosophers.

Timor, the most important of the chain of islands which stretch eastward from Java, has a length of 300 miles, an area of 12,264 sq. m., and pop. of about 500,000. A chain of wood-clad mountains runs throughout its entire length; one peak, Allas, near the south coast, being 11,500 feet in height. It is less volcanic than its smaller neighbours of the Sunda group, but it contains some quiescent or extinct volcanoes. Magnetic iron, porphyry, gold, copper, and sulphur are found. Otherwise the natural wealth of the island is not great, the comparatively dry climate producing a much less luxuriant vegetation than in Java. The exports are mainly maize, sandalwood, wax, tortoise-shell, and trepang. Separated from the Australasian region by the Arafura sea, the island shows few Australian types amongst its fauna and flora, which resemble those of Java, Celebes, and the Moluccas. The population is mainly Papuan, mixed with Malay and other elements. The smaller western portion belongs to the Dutch, with its capital at Kupang; the eastern part is Portuguese, capital Deli; but native chiefs really govern the island.

See Wallace's *Australasia* (1878), Forbes's *Eastern Archipelago* (1885), and Bastiat's *Indonesien* (1885).

Timor-Laut, or TENIMBER, a group of three islands, east of Timor, extending about 100 miles in length, and 2263 sq. m. in area. Unlike Timor, these islands are mainly coralline and correspondingly low-lying, though there is one extinct volcano 2000 feet high. Fauna and flora partake of Malay and Australasian characters. The natives—some 25,000 in number—are of Papuan stock. The islands belong to the Dutch residency of Amboyna. See the books cited at TIMOR.

Timothy and Titus, EPISTLES TO. The first and second Epistles to Timothy, along with the Epistle to Titus, make up the three so-called 'Pastoral Epistles,' whose claim to have been written by the apostle Paul has been unanimously recognised by Catholic tradition since at least the end of the 2d century. They owe the name by which they are collectively known to the fact that they purport to be addressed by the apostle in his old age to his younger companions, Timothy and Titus, with reference mainly to the discharge of the pastoral office; but even apart from this leading feature they are allied to each other in matter and style with special closeness, while at the same time they are separated from the rest of the 'Pauline' writings by their lateness of date, as well as by certain peculiarities common to all three. These peculiarities appear in their attitude alike to the doctrine and to the polity of the church. As regards doctrine, the writer has no longer, properly speaking, anything new to say; the doctrine of the church is no longer in course of discovery and delivery, but has been already exhaustively revealed and definitely fixed. The motto is 'guard the good deposit' (2 Tim. i. 14, R.V. margin), keep 'the right way,' 'the sound doctrine,' 'the sound words.' As Sabatier says: 'With the Epistle to the Philippians the living progress ceases; with the pastoral letters the conservative tradition begins. Paul's doctrine is there; but the soul which sustained and vivified it appears already to have left it. . . . We have reached a point of arrest.' Along with the rise of this conservative tradition a new conception of the function of the church as the 'pillar and stay' of the 'common faith' begins to make its appearance. The church had already of course existed as a visible society and organisation, with special officers for the functions of discipline and administration; and it seems an error to suppose (as has often been done) that even with regard to church government the pastoral epistles contain anything definitely new, such as the germs of monarchical episcopacy. Nevertheless 'the church is no longer identical with "them that are being saved" or "the elect;" it is compared to a "great house," which contains "vessels, some unto honour and some unto dishonour." It is, in other words, no longer an ideal community, the "Israel of God," but a visible society. And being such, its organisation had come to be of more importance than before,' especially in the matter of maintaining and transmitting orthodox belief. Apart from these peculiarities, which are rather to be felt than described, the pastoral epistles are separated from all the others attributed to the apostle Paul by their language and phraseology. They contain a great number of words which do not occur in the other 'Pauline' writings, though met with elsewhere in the New Testament; many of the most marked expressions of Paul are absent; his characteristic particles have disappeared and given place to others; the structure of the sentences is quite different.

External and internal evidence alike go to show that all three epistles belong to nearly the same date; and it is now agreed with practical unanimity that this date cannot have been earlier than the Neronian persecution (64 A.D.). Modern discussions have made it clearly impossible to assign them to any period covered by the book of Acts. The stay of Timothy in Ephesus postulated by 1 Tim.,

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the captivity of the apostle after having been recently at Troas, Corinth, and Miletus, which is presupposed in 2 Tim., and his visit to Crete and proposed sojourn in Nicopolis (Epirus) which are mentioned in Titus, all require us to assume a continued activity of the apostle for an indefinite period after his first Roman imprisonment, an activity, however, of which (apart from the pastoral epistles themselves) tradition knows nothing. Assuming the genuineness of all three, the order in which they were written must have been 1 Tim., Titus, 2 Tim. Modern criticism of the pastoral epistles may be said to have begun with Schleiermacher, who accepted 2 Tim. and Titus as genuine, but thought 1 Tim. to be a non-Pauline compilation from the other two. Eichhorn on chronological and philological grounds argued that none of the three was by Paul, but did not deny that they belonged to the immediate school of the apostle. Baur's criticism was much bolder, assigning them to the middle of the 2d century, when the utility and necessity of a stricter church organisation in order to combat Gnosticism had begun to be felt. Baur detected distinct allusions to Marcion in 1 Tim. vi. 29; Titus, iii. 9. The most important item of external evidence against their genuineness is the fact that Marcion knew of only ten epistles of Paul. Marcion's information may have been defective, but so far as we know he was not wanting in candour or ingenuousness. To sum up briefly the present state of criticism, the pastoral epistles are admittedly very late; but how late is practically impossible to say with our very imperfect knowledge of the state of the church during the decades immediately following the year 64 A.D. It cannot be said to have been made out, or nearly made out, that they are so very late as Baur supposed. But on the other hand all that the apologists can say is that their Pauline authorship is not inconceivable, especially if we suppose the apostle to have lived and laboured a good while after the Roman captivity recorded in the Acts. 'Conceivability' in such matters of course depends a good deal on the individual critic's feeling for language, style, 'atmosphere,' and such like criteria. At the very least we may safely say that they contain elements of a Pauline tradition, and more or less vivid recollections of the substance of his correspondence with Timothy and Titus; possibly they embody some verbatim fragments—e.g. 2 Tim. i. 15–18; iv. 9–21.

See the commentaries of Huther (in Meyer's *Commentar;* Eng. trans.), Alford, Wace (in *Speaker's Commentary*), Weiss (new ed. of Meyer), and Soden (in Holtzmann's *Handcommentar*). For the criticism of the epistles the monograph of Holtzmann is the fullest (*Die Pastoralbriefe kritisch u. exegetisch behandelt*, 1880). Baur's work, *Die sog. Pastoralbriefe des Ap. Paulus* (1835), is still of value. See also the New Testament introductions of Hilgenfeld, Reuss, Salmon, Weiss (Eng. trans.), and Holtzmann; Sabatier's *L'Apôtre Paul* (Eng. trans. 1891), Farrar's excursus to his *Life of St Paul*, and Hatch's article 'Pastoral Epistles' in *Ency. Brit.*

Timothy Grass, the name commonly given to *Phleum pratense*, a grass much valued for feeding cattle. It first received the name Timothy Grass in America, from the name of a person who did much to promote its cultivation there. Along with the other species of the genus, it often receives also the English name of Cat's-tail Grass or Meadow Cat's-tail. The genus Phleum is distinguished by a panicle so compact as to resemble a close spike, single-flowered spikelets, with two nearly equal acuminate or almost awned glumes, two awnless paleæ, and the seed free. The species are mostly natives of Europe; a number of them are British, but the Timothy Grass alone is of any economical value. It varies very much in size according to soil and situation, succeeding best in moist, rich soils. It is very extensively cultivated both in Britain and in America. It has strong culms, attaining a height of 4 to 5 feet, but is tender and nutritious, and much relished by cattle. It is perennial, but springs up rapidly, even in the year in which it is sown. Its spike-like panicle, from the form of which the name Cat's-tail has been given, is cylindrical, and often of several inches in length. The seed is very small. *Phleum nodosum* is a very similar species, perhaps a mere variety, with the lower part of the culm prostrate and swollen into knots or bulbs, the spike much smaller than in *P. pratense*. It is a very inferior grass, and is found only on dry soils.

Timothy Grass (*Phleum pratense*).

Timur. See TAMERLANE.

Tin (sym. Sn; atomic weight, 118·76; sp. gr. 7·3). Either tin itself or an ore of it must have been known from a very early time, as all ancient bronze objects contain a certain proportion of this metal (see BRONZE, and METALLURGY). Ingots of metallic tin and articles made of it have been found in several of the Lake-dwellings (q.v.) discovered on the continent of Europe. It was therefore smelted more than 2000 years ago. Pliny refers to Cornish tin, and the metal is known to have been taken to Italy through Gaul after the Roman conquest of Britain. See also CASSITERIDES.

Tin has a silvery-white colour with a faint yellow tinge, and objects made of it have a brilliant lustre when new or newly cleaned. It does not tarnish readily. When melted and slowly cooled it is obtained in crystals of considerable size. A bar of the metal with a cross section of say a quarter of an inch in area is easily bent, and during the bending emits a crackling sound due to the crushing together of its crystalline particles. Tin is of greater hardness than lead, but it is softer than gold. It is very malleable, and can be beaten into foil as thin as $\frac{1}{1000}$ of an inch. Its tenacity is not great, a wire of the metal $\frac{1}{12}$ of an inch thick breaking with a weight of 56 lb. At the temperature of about 442° F. (228° C.) it becomes brittle enough to be reduced to powder by hammering. At St Petersburg a bar of the metal has been known to break up into small granular particles during a very low winter temperature. The same result may be obtained by lowering its temperature artificially to − 39° C.; at least it is very brittle at this temperature. Tin conducts heat and electricity moderately well. Its melting-point is 455° F. (235° C.), being considerably under that of lead. It is volatile, but only at a very high temperature. Among common metals it is least acted on by air and water, hence its utility for a great many purposes. With the exception of nitric, no acid attacks tin vigorously unless with the aid of heat.

There are two oxides of tin—viz. stannous oxide and stannic oxide, with corresponding series of salts. *Protoxide, monoxide,* or *stannous oxide,* SnO, is prepared by first adding to dichloride of tin a solution of carbonate of soda. The white precipitate produced is the hydrated oxide, which absorbs oxygen from the air; but when heated to

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redness in a current of carbonic acid, or dried in a stream of this gas in the absence of air, anhydrous stannous oxide is obtained as a black powder. The hydrated oxide dissolves readily in acids, but these act more slowly on the anhydrous oxide.

Dioxide, binoxide, or *stannic oxide*, SnO_2, forms on the surface of tin kept at a heat above its melting-point with access of air. This is removed as it forms, and again heated to completely oxidise any of the finely divided tin mixed with it. Stannic oxide is also produced when tin is acted on by nitric acid. It is this oxide of tin which, when finely ground, forms the hard white material known as Putty Powder (q.v.), and used for polishing hard stones and other bodies. It also enters into the composition of one kind of opaque white glass. Stannic oxide occurs in nature as the mineral cassiterite, the ordinary ore of tin.

Hydrated stannic oxide or *stannic acid*, H_2SnO_3, is obtained by adding carbonate of lime to tetrachloride of tin; also by adding an acid to stannate of potash or soda. It is a white gelatinous substance, acting as a base by combining with acids, as in tetrachloride of tin, or as an acid combining with bases to form salts, stannate of soda (sodium stannate), Na_2SnO_3, for example. But there is another state in which this acid occurs with quite different properties, when it is termed *metastannic acid.* If tin is placed in nitric acid of about 1·3 sp. gr., it is rapidly converted into a white crystalline powder having the same composition as stannic acid, but represented by the formula of this acid multiplied by five to account for its salts having only ⅕ the quantity of base; thus, metastannate of soda is $H_8Na_2Sn_5O_{15}$. Metastannic acid is insoluble in all ordinary acids (except undiluted sulphuric acid), but it is readily soluble in alkalies, and the salts thus formed are converted into stannates by heating with excess of the base. The stannate of soda is used in calico-printing.

Sulphides of tin.—The monosulphide of tin, or stannous sulphide, SnS, is black, and stannic sulphide, SnS_2, yellow, the latter being soluble in sulphide of ammonium. Under the name of *mosaic gold* stannic sulphide is used as a bronze powder for bronzing articles made of plaster of Paris, wood, &c. There is a native sulphide of tin and copper.

Dichloride of tin or *stannous chloride*, $SnCl_2$, is obtained by boiling the granulated metal with moderately strong hydrochloric acid. It crystallises with two molecules of water. A solution of this salt, unless made slightly acid, soon shows a slimy whitish deposit by which it is easily recognised. It is a powerful deoxidising agent, persalts of iron being converted into protosalts when it is added to their solutions, and with other salts, such as those of mercury, causing a deposit of the metal. It is used as a test for gold in solution, giving a purple colour.

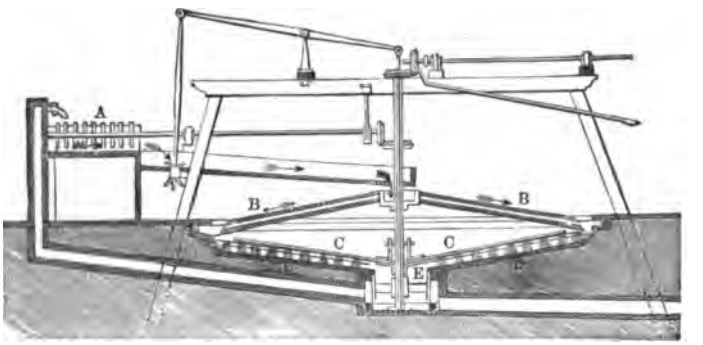
Tetrachloride of tin or *stannic chloride*, $SnCl_4$. This salt is formed when chlorine gas is passed over melted tin. It is also got as an anhydrous volatile liquid when powdered tin is distilled along with corrosive sublimate. It fumes when it meets the air, and has long been known as *fuming liquor of Libavius.* A more or less pure salt of this kind is used by dyers, made by dissolving tin in a mixture of hydrochloric and nitric acids. The chlorides of tin, like the stannate of soda, are used as mordants in dyeing. All the salts of tin give a bead of the metal when heated on charcoal in the inner blowpipe flame.

Ore and Smelting.—Tinstone or *cassiterite*, which is the binoxide of tin (often found in a nearly pure state), is the chief ore of the metal. Nearly all the tin of commerce is obtained from it. This mineral is usually of a dark-brown or blackish colour, but it is sometimes yellowish brown or gray. Its specific gravity is high—viz. from 6·3 to 7·1—and it is also very hard. It is found crystallised in quadrangular prisms, terminated by four-sided pyramids, and in more complex forms; and when pure consists of tin 78 and oxygen 22. Tinstone occurs in veins or lodes in granite or granitic rocks, gneiss, clay-slate, and mica-slate.

Wood-tin or *fibrous tin* is a fibrous form of cassiterite occurring in globular, botryoidal, or wedge-shaped fragments, usually of a small size. In colour and structure it has some resemblance to dry wood. *Stream tin* is again the same mineral found in the alluvial debris forming the beds or sides of streams. It has in course of time become separated by the disintegration of the veinstone, and is washed out of the gravel or debris.

The older tin-producing countries are England (Cornwall), Germany (Bohemia and Saxony), and, for small quantities, France and Spain, in Europe; Malacca, Banca, and some neighbouring islands in southern Asia; and Chili, Peru, Bolivia, and other South American states. The most important of recently discovered tin districts are in Australia, those in New South Wales and Victoria being as yet most productive. Tasmania also yields a considerable supply. In the United States, though none is yet largely worked, there are rich deposits of both vein ore and stream tin, from the opening up of which great results are expected. These occur at Harney Peak, South Dakota; Martha Cash, Virginia; Temescal, California; and a few other places.

Tin ore from the mine is subjected to a complicated series of dressing operations. The tinstone of Cornwall especially is associated with a large number of other minerals, which require to be as much as possible separated from it before smelting. Of these copper and arsenical pyrites and wolfram (when this is present) are got rid of by special chemical processes. For the mechanical dressing processes stamps, buddles, pulverisers, &c. are required, and these are noticed under METALLURGY. The following is a summary of the stages in the dressing of the ore: (1) it is reduced to grains by stamps; (2) a portion of the waste material is then removed by centre head and concave buddles (see figure); (3) more waste is next separated in the



Borlase's Concave Buddle—vertical section:
A, box with agitator: the ore is fed here; B, revolving spouts for distributing the ore at circular ledge; C, arms with sweeps; D, floor on which the washed ore settles; E, well into which waste and slime falls.

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tossing tub; (4) at this stage the sulphur and arsenic are driven off by heat—calcining; (5) after the calcining the ore is reduced by a pulveriser, of which there are several kinds, to a fine sand; (6) the sand is then finally washed on slime frames or buddles to separate the 'black tin'—i.e. the pure, or comparatively pure, tin ore.

In order to separate the arsenic and sulphur which, in the form of arsenical and common pyrites so commonly accompany Cornish tinstone, the ore in the fourth stage of dressing (see above) is calcined. There are two kinds of calciners in use—viz. Brunton's, which has a revolving circular hearth, with stirrers, and Oxland and Hocking's, the chief feature of which is a revolving iron cylinder, lined with firebricks. This cylinder is fitted up in a sloping position, with a fireplace at the lower end. The ore is fed at the top, and as it descends parts with the sulphur and with the arsenic, which, as 'crude arsenic' (arsenious acid), is collected in the specially constructed flues of a chamber in connection with the cylinder-furnace. See ARSENIC.

Tin ores which contain the mineral wolfram (tungstate of iron and manganese) are treated by a special process, patented by Mr R. Oxland of Plymouth. This mineral and tin ore are so nearly the same in specific gravity that no mechanical method of washing will separate them. Oxland's process consists in treating in an iron pan in a reverberatory furnace the tin ore with sulphate or carbonate of soda, for the purpose of converting the insoluble tungstate of iron and manganese into the soluble tungstate of soda, which is easily removed by lixiviation. The oxides of iron and manganese, which are left in a finely divided state, can then, from their lower density, be readily got rid of by washing. The tungstate of soda procured in the operation has been employed for rendering cotton cloths non-inflammable and as a mordant in dyeing and printing calico.

In England the dressed tin ore is reduced in a reverberatory furnace, somewhat similar to that used for smelting copper (see COPPER, fig. 1). It is mixed with one-fifth of its weight of anthracite coal, broken into small pieces, and a small quantity of lime or fluor spar to combine with siliceous matter in order to form a fusible slag. The heat is slowly raised with as little admission of air as possible, so as to maintain a reducing atmosphere. When the charge has been some hours in the furnace it is occasionally stirred to assist the aggregation and separation of the slag, and in about six hours the metal is ready to be run off. The tin flows out of the furnace by an aperture in the middle of one side—towards which all the rest of the bed slopes—into a cast-iron pot, from which it is cast into bars. The tin at this stage contains other metals, such as arsenic and iron, as impurities, so that it requires to be refined, and this is done by *liquation* and *poling*. The process of liquation consists in placing the bars of tin on the hearth of a furnace, such as has been described, and slowly heating them to just above the fusing-point, when pure or nearly pure tin melts and runs down the sloping furnace-bed into a cast-iron vessel, fresh bars being added until enough of the metal is collected. What remains on the hearth is a less fusible alloy of tin with arsenic, iron, and other metals. The nearly pure tin is kept by a fire in the melted state, and stirred up with a pole of green wood, the operation producing a current of gas that agitates the molten metal and causes a scum to rise to the surface, which is skimmed off. The tin is then run into moulds for the market, *grain-tin* being the name given to the best quality of the metal. It is known by its property of becoming brittle when heated to just below its melting-point, so that when it is then let fall from a height, or struck with a hammer, it breaks up into prismatic fragments. Banca tin is the purest kind made on a commercial scale, and is nearly chemically pure. English tin comes next to it as regards purity.

Applications.—The great consumption of tin is in the formation of alloys, such as bronze, gun-metal, Britannia metal, &c. (see ALLOY), and in the manufacture of tinned iron plates. In the form of an amalgam it is employed for 'silvering' mirrors, and as tinfoil for lining boxes and wrapping up perishable articles. The small gas-pipes of houses are best made of block-tin. Ordinary commercial tin tarnishes very slightly in the air, and is not acted upon by vinegar or the acids of fruits. It is consequently very suitable for coating the inside of cooking vessels, whether made of iron or copper. Large vessels for other purposes formed of these metals are also occasionally coated with tin. In some parts of India vases, jugs, and other useful and ornamental articles are made entirely of tin. The uses of some tin salts are noted above.

The quantity of tin ore raised in Cornwall has not varied much for many years. It amounted (with the trifling addition from Devon) in 1890 to 14,911 tons of dressed ore, yielding of metallic tin 9602 tons, the value of which was £937,760. In the same year the total imports into Great Britain were 2663 tons of tin ore, value £96,593, and 27,038 tons of metallic tin, value £2,547,416. Of this total, counting both ore and tin, the Straits Settlements furnished considerably more than one-half, and Victoria and New South Wales together one-fifth.

See TIN-PLATE, and STANNARIES; P. W. Flower, *History of the Trade in Tin and Tin-plates* (1880); A. G. Charleton, *Tin-mining Abroad* (1884); and L. F. Blinn, *Companion for Tin-workers* (1891).

Tinamou (*Tinamus*), a South American genus of birds sometimes called partridges, but really more akin to bustards, and having affinities with the Rhea and Emu. *T. major* or *brasiliensis* is about 18 inches long.

Tincal. See BORAX.

Tinchebrai, a small town (pop. 2429) in the extreme north-west of the Norman department of Orne, where Henry I. (q.v.) of England defeated his brother Robert.

Tincture. See HERALDRY, Vol. V. p. 661.

Tinctures are defined by Sir Robert Christison to be 'solutions of vegetable and animal drugs, and sometimes of mineral substances in spirituous liquids.' The spirit most commonly employed is proof-spirit (see ALCOHOL, Vol. I. p. 133): sometimes rectified spirit is used, and occasionally ether. Ammonia is sometimes conjoined with the spirit, in which case the solution is termed an ammoniated tincture. The choice between proof and rectified spirit depends on their respective solvent powers over the active principles of the drugs employed. The ether and ammonia are principally used for their antispasmodic properties.

Tindal, MATTHEW, a notable deistical writer, was the son of the rector of Beerferris in South Devon, where he was born in 1656. He was educated at Lincoln and Exeter Colleges, Oxford, took the degree of B.A. in 1676, and was elected fellow of All Souls College. In 1685 he became a Doctor of Law; and after a brief lapse into Romanism during the reign of James II., reverted to Protestantism of a somewhat freethinking type. His first work, *An Essay concerning Obedience to the Supreme Powers* (1693), was followed by others on the powers of the magistrates in religious matters, on the liberty of the press, &c.; but it was not till 1706 that he attracted special notice, when the publication of his treatise on *The Rights*

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of the Christian Church asserted against the Romish and all other Priests raised a storm of opposition. A perfect torrent of replies and refutations of this statement of state supremacy over the church poured from the press; but even a prosecution failed to prevent the appearance of a fourth edition in 1709, to which a *Defence* was added. On the Continent Tindal's work was quite differently received. Le Clerc praised it as one of the solidest defences of Protestantism ever written. In 1730, when he had nearly reached the age of seventy-three, he published his most celebrated treatise, *Christianity as old as the Creation, or the Gospel a Republication of the Religion of Nature*, which effectually settled the question of his religious creed. The design of the work, which was soon known as 'the Deist's Bible,' is to strip religion 'of the additions which policy, mistake, and the circumstances of the time have made to it'—in other words, to eliminate the supernatural element, and to prove that its morality, which is admitted to be worthy of an 'infinitely wise and good God,' is its true and only claim to the reverence of mankind. Tindal's purpose was rather constructive than destructive; and it was on this account that he called himself a 'Christian Deist.' Answers or refutations were issued by Waterland, Foster, Conybeare (afterwards Bishop of Bristol), Leland (q.v.), and others; the work itself was translated into German. Tindal died at Oxford, still a fellow of his college, on the 16th August 1733. See the article DEISM, and works there cited.

Tinder, an inflammable material, usually made of half-burned linen. It was one of the chief means of procuring fire before the introduction of chemical matches. The tinder was made to catch the sparks caused by striking a piece of steel with a flint; and the ignited tinder enabled the operator to light a match dipped in sulphur. This intermediate step was necessary in consequence of the impossibility of making the tinder flame. Partially decayed wood, especially that of willows and other similar trees, also affords tinder; and certain fungi furnish the German tinder, or Amadou (q.v.).

Tinea, the generic name of certain diseases of the skin caused by the growth of microscopic fungi. See under FAVUS, PITYRIASIS, RINGWORM.

Tineidæ, a family of small Moths (q.v.).

Tinfoil. See FOIL.

Ting-hai. See CHUSAN.

Tinker's Weed (*Triosteum perfoliatum*, erroneously called Tinkar's-root), the Fever-weed, with purgative and emetic properties, so called after an 18th-century New England doctor.

Tinned Meat. See PRESERVED PROVISIONS.

Tinneh. See AMERICAN INDIANS.

Tinnevelli (*Tirú-nel-véli*), chief town of the British district of the same name, is situated 1¼ mile from the river Tambraparni. The town of Tinnevelli is connected with the town and military station of Pallamcotta, on the opposite bank of the river, which is the administrative headquarters of the district. It contains a Sind temple and a Hindu college, and has a cotton-factory. It is an important Protestant missionary centre, and the terminus of the Tinnevelli branch of the South Indian Railway. Pop. 23,221.

Tinnitus Aurium is the Latin translation of, and ordinary medical term for, ringing in the ears. In most cases it is an unimportant symptom, depending on some local temporary affection of the ear, or on some disturbance of the digestive system with which the part of the brain, from which the auditory nerve springs, sympathises, or which excites the cerebral circulation (as often occurs in the morning after too liberal evening potations); but, as it is also a common symptom of organic disease of the auditory nerve, it may indicate a dangerous condition, or may be a prelude to complete deafness. Hence, although commonly of no consequence, it is a symptom that, especially if permanent, must be carefully watched. It may be readily induced for a few hours by a large dose of quinine, salicine, or their compounds. Tinnitus is of course the proper pronunciation, but in medicine it is usually called *tinnitus*.

Tino. See TENOS.

Tin-plate. The manufacture of this article forms a branch of the iron trade. The art of tinning plate-iron is said to have been invented in Bohemia, about the beginning of the 16th century, although the tinning of copper was known earlier. Tin-plate was first made in England about 1670. Sheet-iron for tin-plates is made either of charcoal-bar or coke-bar, which has been rolled with particular care, in order to avoid scales on the surface. Before tinning the plates are called 'black plates.' When the iron has been cut to the required size the plates are 'pickled'—i.e. they are immersed in hot sulphuric or hydrochloric acid which has been diluted by 16 parts of water to 1 of acid, the use of the acid being to remove all oxide. After this the plates require to be washed several times in water, and then annealed. The plates are next passed two or three times through chilled iron rollers highly polished with emery and oil, to give them a well-polished surface. Once more they are sent to the annealing furnace, passed again through dilute sulphuric acid, which is followed by another washing, but this time in running water, and then scoured with sand. This should leave them quite clean and bright.

Each plate is now put singly into a pot of melted grease (which has become sticky by use), and left till it is completely coated, after which the plates are taken in parcels and plunged into a bath of melted tin covered with grease, called the 'tin-pot.' The plates are afterwards put in parcels into the first of the two compartments of a vessel, where they receive a coating of purer tin than that of the 'tin-pot,' and are then withdrawn one by one, and wiped on both sides with a hemp brush, the marks of which are obliterated by another dipping in the second compartment of the 'wash-pot.' This last dipping also gives the plates a polish. The superfluous tin is removed by immersing the plates in a pot containing tallow and palm-oil, maintained at a temperature just high enough to allow the tin to run off. The final treatment consists in working the plates separately in troughs of bran with a little meal, and then rubbing them with flannel. Of late years tin-plates of mild steel have been manufactured, and for some purposes they are preferred to iron tin-plates.

There is a variety of tin-plates called 'terne-plates,' coated with an alloy of tin and lead, in which the proportions vary from 1 of lead and 2 of tin to 2 of lead and 1 of tin.

The manufacture of tin-plates is chiefly carried on in South Wales, where they are made on a very extensive scale. In 1890 the total exports from Great Britain amounted to 421,797 tons, valued at £6,361,477. Of this quantity as many as 321,109 tons were sent to the United States. The figures for the previous year were nearly the same. By the McKinley tariff an exceptionally high protective duty (2$\frac{1}{10}$ cents per lb. instead of 1 cent till then) has been imposed on tin-plates imported into the United States, with the view of establishing the manufacture of them there.

Tinsel, glittering metallic sheets, as of burnished brass, copper, or tin, almost as thin as foil,

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and used in discs, patches, strips, or threads for giving clothing, &c. a sparkling appearance.

Tintagel Head, a cliff 300 feet high on the western coast of Cornwall, about 22 miles W. of Launceston, and but 6 miles from Camelford—the Camelot of Arthurian legend. Partly on the mainland and partly on the so-called island, almost cut off by a deep chasm from the rest of the promontory, stand the imposing ruins of the castle where King Arthur held his court. His spirit still hovers around the scene of his splendour in the form of the red-legged chough, a beautiful Cornish bird already rare in Leland's time. The oldest part of the existing ruins is the keep, apparently of Norman construction, but there need hardly be a doubt that a Saxon, and perhaps earlier a British stronghold occupied the same site. The castle was still habitable in 1360, when we read of its being provisioned.

Tintern Abbey, perhaps the most beautiful ruin in England, on the right bank of the Wye, in Monmouthshire, about 5 miles above Chepstow. The abbey was founded in 1131 for Cistercian monks, but the church, the finest part of the ruins, dates from the end of the following century. The length of the building is 228 feet; the style of architecture a transition from Early English to Decorated; the window-tracery is especially fine. But the greatest glory of Tintern Abbey is that its name is associated with Wordsworth's noblest poem, *Lines composed a few Miles above Tintern Abbey*—though, as every reader knows, the abbey itself is not mentioned in it. See works by C. Heath (1793), G. Cooper (1807), and W. H. Thomas (2d ed. 1845).

Tintoretto (in English often shortened into *Tintoret*), a great Italian painter, so called from the fact of his father being a dyer (*Tintore*), but whose real name was Jacopo Robusti, was born at Venice, 29th September 1518. He studied for a short time under Titian, but appears to have been for the most part self-taught. His motto was 'The design of Michaelangelo and the colouring of Titian;' and his aim was obviously to combine the dignity of the Florentine with the romanticism of the Venetians; but, though in the estimation of most of his contemporaries he succeeded, there has subsequently been diversity of opinion as to his merits. One of Ruskin's 'five supreme painters,' he was unquestionably a great master of composition, drawing, and colour; his conceptions are often grand and his chiaroscuro startlingly effective. But he was strangely unequal; some of his earlier pictures are very carefully finished, but his later ones are dashed off with a fatal haste that justifies the epithet *Il Furioso*, and the remark of Annibal Caracci, that 'if he was sometimes equal to Titian, he was often inferior to Tintoretto.' His portraits are generally admirable. Many of his pictures are of prodigious size. Of the innumerable pictures in the galleries that are attributed to him not a few are by other hands. Venice contains many undoubted specimens of his art; there are a number in England, including 'St George and the Dragon' in the National Gallery at London. Other famous pictures from his hand are 'Belshazzar's Feast, and the Writing upon the Wall' (fresco, for the Arsenal at Venice), 'The Tiburtine Sibyl,' 'The Last Supper and the Washing of the Disciples' Feet,' 'The Crucifixion,' 'The Worship of the Golden Calf,' 'The Last Judgment' (the last two immense pictures 50 feet high, and very splendid in conception), 'St Agnes restoring to Life the Son of a Prefect,' 'The Miracle of St Mark,' 'The Resurrection,' 'The Slaughter of the Innocents,' and the largest picture on canvas by any great master, the 'Paradise' (1858) of the Ducal Palace at Venice, 34 feet high by 74 long, and containing over 100 figures. Tintoretto, who ranks as the head of the later Venetian school, died 31st May 1594.

See, besides the general histories of painting, Crowe and Cavalcaselle's *Titian* (1876), Ruskin's *Stones of Venice* (1851-53), and the small monograph in the 'Great Artists' series by W. R. Osler (Lond. 1879).

Tinworth, GEORGE, artist in terra-cotta, was born in London, 5th November 1843, the son of a poor wheelwright, and while working in his father's shop took to wood-carving of his own accord. In 1861 he found opportunity to get lessons in an art school at Lambeth, and in 1864 entered the Royal Academy schools. He soon began exhibiting figures and groups of figures at the Royal Academy, and in 1867 obtained a permanent appointment in the great Doulton art pottery. The works by which he became famous were mainly terra-cotta panels with groups of figures in high relief illustrating scenes from sacred history, which happily combine grace, strength, and dignity with originality of design, dramatic effectiveness, and devout feeling. An important example is the reredos in York Minster, with twenty-eight terra-cotta panels.

See an *Essay on the Life and Works of G. Tinworth*, by E. W. Gosse (1883), and *Strand Mag.* (Nov. 1891).

Tippecanoe, a river of Indiana, which rises in the northern part of the state, flows WSW. and S. 200 miles, and empties into the Wabash 10 miles above Lafayette. It is famous for the battle fought near its mouth, November 7, 1811, in which the Indians, under Tecumseh's brother, the prophet, were defeated by General Harrison.

Tipperah (*Tipura*), a district of the division of Chittagong (q.v.); Hill Tipperah being a small tributary state on its borders.

Tipperary, an inland county of the Irish province of Munster, touching Galway on the north and King's County, Queen's County, and Kilkenny on the east. Area, 1659 sq. m., or 1,061,731 acres, of which 843,837 are arable. The county of Tipperary for the most part lies in the basin of the river Suir (total length 85 miles); the Shannon touches the north-west border. The surface is generally level, but is diversified by several mountain ridges or groups. These mountains are the Galtees, rising to 3008 feet, Knockmeledown (2609 feet high), and Slievenaman on the south; Keeper Mountain on the west; and the Slievardagh Hills on the east. There is one very curious isolated height called the Devil's Bit, to which many popular legends attach. The soil of the plain is a rich calcareous loam, singularly fertile and productive, especially the district called the Golden Vale, in which stands the town of Tipperary. In geological formation the plain belongs to the great central carboniferous limestone district. Anthracite coal is worked; copper, lead, and zinc occur in smaller quantities; and slates and pipeclay are available. The principal occupation is agriculture, especially dairy-farming. The county, which since 1885 sends four members to parliament, is divided into two ridings, North and South, each of which is subdivided into six baronies. Pop. (1841) 435,553; (1871) 216,713; (1881) 199,612; (1891) 172,882, of whom 162,025 are Roman Catholics.

Anciently Tipperary formed part of the two distinct principalities of Ormond, or North Munster, and Desmond, or South Munster; after the English invasion Tipperary was formed into a county by King John in 1210; but the authority of the conquerors was long little more than nominal. Eventually it came to be divided between the Anglo-Norman families of Butler, which held Ormond, and Geraldine, to whom a portion of Desmond fell. The antiquities are numerous, as well Celtic as Anglo-Norman. In the latter the

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city of Cashel (q.v.) is specially rich; and Holy Cross is a noble monastic ruin, whilst the castle of Cahir is a fine specimen of baronial architecture. There is a series of caves near the border of the county of Cork.

TIPPERARY, the county town, is 110 miles SW. of Dublin by rail, with a Catholic and a Protestant church, and has a noted butter-market; pop. 7274. In 1890, under the 'Plan of Campaign,' a 'New Tipperary' was founded to thwart the proprietor of the land on which Tipperary town is built, and opened on 12th April; but the scheme wholly collapsed in the course of the following year.

Tippermuir. See MONTROSE, p. 294.

Tippoo Sahib (more correctly *Tipú Sultan*), sultan of Mysore, and son of Hyder Alí (q.v.), was born in 1749. Efforts were made to carefully instruct him in the various branches of learning cultivated by Mohammedans; but Tippoo much preferred the practice of athletic exercises, and the companionship of the French officers in his father's service, from whom he acquired a considerable acquaintance with European military tactics. This knowledge he put to effective use during his father's various wars, by completely routing Colonel Bailey (1780 and 1782), and Colonel Braithwaite on the banks of the Coleroon (1782), though these were his only important engagements with the British forces in which he could boast of success. On the death of his father he was crowned with little ceremony, returning at once to the head of his army, which was then engaged with the British near Arcot. In 1783 he captured and put to death most of the garrison of Bednur; but news of the peace between France and England having reached his French allies, they retired from active service, and Tippoo ultimately agreed to a treaty (1784) stipulating for the *status quo* before the war. During the continuance of this peace he occupied himself in regulating the internal administration of Mysore, sent ambassadors in 1787 to France to stir up a war with Britain, and, failing in this, at length so far allowed his inveterate hatred of the English to overcome his judgment as to invade (1789) the protected state of Travancore. In the ensuing war (1790–92) the British, under Colonel Stuart and Lord Cornwallis, were aided by the Mahrattas and the Nizam, who detested their powerful and aggressive neighbour; and though the tactics of the sultan in laying waste the Carnatic almost to the very gates of Madras baffled his opponents for a time, he was ultimately compelled (1792) to resign one-half of his dominions, pay an indemnity of 3030 lakhs of rupees, restore all prisoners, and give his two sons as hostages for his fidelity. Nevertheless his secret intrigues in India against the British were almost immediately resumed; another embassy was sent to the French; and the invasion of Egypt by the latter in 1798 and Tippoo's machinations having become known to the governor-general almost simultaneously, it was resolved to punish the perfidious sultan. Hostilities commenced in March 1799, and two months after Tippoo was driven from the open field, attacked in his capital of Seringapatam, and after a month's siege slain in the breach at the storming of the fort (4th May). He was buried, during an appalling thunderstorm, in the mausoleum he had built for his father. His government of Mysore after 1792 was of a most oppressive character, yet Tippoo was extremely popular, and after his death was esteemed by the Mohammedans as a martyr to the faith of Islam.

Tipton, a town of Staffordshire, 4½ miles SSE. of Wolverhampton and 8½ NW. of Birmingham. It has important iron manufactures. Pop. (1851) 24,872; (1891) 29,314.

Tipula. See DADDY-LONG-LEGS.

Tiraboschi, GIROLAMO, the historian of Italian literature, was born at Bergamo, 28th December 1731, studied at Monza, became a Jesuit, and was afterwards appointed to a chair of Rhetoric at Milan, and in 1770 became librarian to the Duke of Modena. Here he wrote his *Storia della Letteratura Italiana* (13 vols. 1772–82), an elaborate, accurate, and exhaustive survey down to the close of the 17th century. A continuation embracing the literature of the 18th century was written by Lombardi. Tiraboschi died at Modena, June 3, 1794. Other works are *Vetera Humiliatorum Monumenta* (3 vols. 1766–68), *Biblioteca Modenese* (1781–86), and *Memorie Storiche Modenesi* (1793).

Tiree. See TYREE.

Tiresias, in Greek Mythology, figures as a famous prophet, who, according to one legend, was struck blind by the goddess Athena, because he had seen her bathing. Another legend represents Hera as depriving him of his sight because, being made arbiter in a dispute between her and Zeus, he had decided in favour of the latter; when Zeus as a compensation granted him the inner vision of prophecy, and prolonged his life for several generations. He is consequently prominent in many of the mythical stories of Greece, but at last found death after drinking from the well of Tilphossa. Tiresias is the theme of a fine poem by Lord Tennyson (1885).

Tirhut, formerly a district of Bengal, but in 1875 divided into the districts of Darbhangah (q.v.) and Muzaffarpur (q.v.).

Tirlemont (Flemish *Thienen*), a town of Belgium, in South Brabant, on the Great Geete, 30 miles ESE. of Brussels by rail. It has two fine churches of the 12th and 13th centuries, and manufactures of machinery, hosiery, flannel, leather, sugar, &c. Once a large and prosperous city, Tirlemont was ravaged by Marlborough in 1705; and here the French, under Dumouriez, defeated the Austrians in 1793. Pop. (1888) 15,315.

Tirnova, a town of Bulgaria, on the Jantra, 35 miles SSE. of Sistova, amidst strange limestone-rocks. It became in 1235 the seat of the Bulgarian patriarch, and has more than once served as the capital. Dyeing is carried on, and silk and coarse cloth are manufactured. Pop. 11,314.

Tironian Notes. See SHORTHAND, p. 415.

Tirso de Molina. See TELLEZ.

Tiryns, an ancient city of Argolis, in the Peloponnesus, situated a short distance SE. of Argos, about 3 miles from the head of the Argolic Gulf. In fable it was founded by Prœtus, brother of Acrisius, and predecessor of Perseus, and here the early life of Hercules (*Tirynthius*) was spent. About 468 B.C. the city was destroyed by the Argives, but the ruined walls of the citadel remained the wonder of later ages. The Cyclopean walls of Tiryns and of the neighbouring city of Mycenæ are the grandest in Greece. The citadel was built on an oval-shaped rock, 330 yards long by 112 at its widest, fringed by a wall, 30 to 40 feet thick, and about 50 feet high (from the outside base), composed of blocks, bedded in clay, 10 feet long by 3½ wide. The area of the city was divided into three parts at successive levels, and one of these was completely excavated by Schliemann in 1884–85, thus exposing the complete plan of a Greek palace of the 11th or 10th century B.C. See Dr Schliemann's *Tiryns* (Lond. 1886).

Tischendorf, LOBEGOTT FRIEDRICH KONSTANTIN VON, a very eminent biblical scholar, was born at Lengenfeld in Saxony on January 18, 1815, and studied theology and philology at Leipzig, where in 1839 he became a university lecturer.

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His labours in search of the best and most ancient MSS. of the New Testament, in which he was liberally assisted by the Saxon and Russian governments, were exceedingly valuable, especially those in 1844, 1853, and 1859, which resulted in the discovery of the Sinaitic Codex (see CODEX) at the monastery on Mount Sinai; those journeys he described in *Reise in den Orient* (2 vols. 1846; Eng. trans. 1847) and *Aus dem Heiligen Lande* (1862). Among the most important of his numerous works are the editions of the Sinaitic (1862; in fac-simile in 1863) and many other MSS. of the New Testament; the *Eighth Critical Edition of the New Testament* (1864–72), and several other editions of the New Testament text; an edition of the Septuagint; and the *Monumenta Sacra Inedita* (1846–71). The pamphlet *When were our Gospels Written?* defending the genuineness and authenticity of the four gospels, was translated into English in 1866. After being an extra-ordinary and ordinary professor at Leipzig from 1845, he became professor of Theology and of Biblical Palæography in 1859, a chair in the latter subject having been instituted for him. He was created a Count of the Russian empire, an LL.D. of Cambridge, a D.C.L. of Oxford, &c. He died on December 1, 1874. There is a sketch of his life by Volbeding (1862).

Tissandier, GASTON. See BALLOON.

Tissues, aggregates of cells which have certain characters in common. They may be classified in various ways according as attention is directed to their structural, functional, or developmental characters. Thus, in an animal, 'cellular tissues,' in which the unit elements retain their distinctness, may be distinguished from those of muscle and nerve, in which there is usually much modification and integration of the component cells. Or, in plants, 'cellular tissues' may be distinguished from 'vascular tissues,' in which the component cells are fused to form vessels. In these distinctions only structural characters are considered. Again, we may distinguish in an animal nervous tissues, muscular tissues, glandular tissues, skeletal tissues, and so on, the classification here depending on the function. In the same way the tissues of a plant may be distinguished as absorptive, assimilative, conductive, glandular, skeletal, protective, and so on. In short, the physiological conception of a tissue is that of an aggregate of cells in which by division of labour within the body there has come to be a predominance of one function. Or, if we consider the origin of the several tissues from the different layers of the embryo, we distinguish the ectodermic or epiblastic, the mesodermic or mesoblastic, the endodermic or hypoblastic tissues of animals, and similarly in higher plants we distinguish those which arise from the dermatogen, periblem, and plerome of the embryo or growing-point. The commonest classification of animal tissues is perhaps that which distinguishes four sets—(*a*) epithelial, including covering and lining layers of cells, and their secretory or other modifications; (*b*) muscular; (*c*) nervous; (*d*) connective tissues; but the last includes a great variety—e.g. bone, cartilage, ligaments, and enswathing membranes. One of the most convenient classifications of vegetable tissue is that which distinguishes (*a*) cellular tissues—epidermis, parenchyma, prosenchyma; (*b*) vascular tissues—vessels of the wood, vessels of the bast, and laticiferous vessels. See CELL, EPIDERMIS, EPITHELIUM, MUSCLE, NERVOUS SYSTEM, PHYSIOLOGY, VEGETABLE PHYSIOLOGY, &c.

Tit, or TITMOUSE, a name given to several genera of Passerine birds, belonging to the family Paridæ, in which also the Nut-hatches (Sittidæ) and Goldcrests (Regulidæ) are sometimes placed. The typical tits are small birds, of which there are over sixty species, widely distributed throughout Europe, Asia, Africa, and North America. They are more numerous in cold and temperate than in tropical regions, those which are found within the tropics being mostly inhabitants of elevated mountainous districts. The bill is small, short, somewhat conical, the tip entire, the base beset with hairs, and the nostrils generally concealed by feathers. The wings are not very long; the tail is rounded or even; the legs rather short, slender, scaled in front, the inner toe shortest, the claws long and curved. The plumage is soft, lax, and fluffy, often gay. The popular name Titmouse is derived from Anglo-Saxon *máse*, a small bird (*tit*, 'small'). The tits are bold sprightly birds, extremely active, flitting from branch to branch, running rapidly along branches in quest of insects, and often clinging back-downwards to the under side of branches. They feed not only on insects but on grain and seeds, occasionally eat carrion, and sometimes kill young and sickly birds by strokes of their bill. They are very pugnacious, and the female tit shows great courage in defence of her nest, often continuing to sit when the nest is approached, and vigorously assailing the intruding hand with her bill. In winter many of the species gather into small flocks, and approach houses and villages, competing with sparrows and chaffinches for a share of the food of domestic poultry. Most of the tits lay at least six eggs, some of them twelve or more, and even in temperate countries they often produce two broods in a year. They generally build in holes in trees,

Blue Tit (*Parus cæruleus*).

&c. The young are fed chiefly on caterpillars. A pair of blue tits have been observed to carry a caterpillar to their nest, on an average, every two minutes during the day, so that these birds must be extremely useful in preventing the multiplication of noxious insects. Six species are found in Britain, but one of them, the Crested Tit (*Parus cristatus*), is very local, being almost entirely confined to a few old pine-forests in Scotland. The Great Tit (*P. major*) is the largest European species. It is common in almost all parts of Europe. It is not quite six inches long; the head and throat are black; the cheeks are white; the breast and sides yellowish; the wings and tail grayish. Its usual note is a kind of chatter, but it sometimes imitates the notes of other birds. The Blue Tit (*P. cæruleus*) and the Cole Tit (*P. ater*) are very common in Britain. The blue tit is perhaps the most pert and audacious of all the British species. It very generally receives the familiar name of *Tomtit*. The upper part of the head is light blue, and a bluish tinge prevails in the plumage. The Long-tailed Tit (*Acredula caudata*), common in Britain, has the tail about as long as

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the body. Its crown is white, contrasting beautifully with the deep black of the back; the tail is also black, with white edges. The nest of this bird is a beautiful structure, of moss and wool externally covered with lichens, and profusely lined with feathers, nearly oval, with a small hole in the upper part of one side. Still more interesting is the nest of the Penduline Tit (*Aegithalus pendulinus*) of the south of Europe, which in form resembles a flask, and is generally suspended at the end of a flexible twig, in a situation near to or overhanging water. It is nicely woven of fibres of bark

Long-tailed Tit (*Acredula caudata*).

and the down of willow or poplar catkins, and the opening is in the side. The Chickadee or Black-cap Tit (*P. atricapillus*) is very common in North America. The Tufted Tit (*P. bicolor*) is the largest American species. British specimens of the Cole and Long-tailed Tits differ somewhat from continental examples, and are sometimes held to be specifically distinct. The so-called Bearded Tit (*Panurus biarmicus*) belongs to a distinct family (Panuridæ). It frequents reed and osier beds, and the male is tawny, with gray head and black moustaches, which ornaments are absent in the female. It is rare in England. See Howard Saunders, *Illustrated Manual of British Birds* (Lond. 1889); Gould, *Birds of Great Britain, Birds of Asia.*

Titania. See MAB, OBERON.

Titanium (sym. Ti, eq. 48) is a comparatively rare metal, which, according to the method by which it is procured, occurs as a gray, heavy, iron-like powder, which burns with brilliant scintillations in the air, forming titanium dioxide and nitride. It decomposes water at the boiling-point and is soluble in hydrochloric acid. It never occurs native, but is present as the dioxide in the minerals Rutile (q.v.), brookite, and anastase. Commercially it is of little value, and its chief outstanding property is the readiness with which it combines with nitrogen under the influence of heat.—*Titanite*, or sphene, is a soft mineral, green, yellow, or yellowish green, has strong refractive and dispersive power on light, and has a brilliant play of diamond-like colour-effects. It is often present in Syenite (q.v.).

Titans, in Greek Mythology, were the sons and daughters of Uranus (Heaven) and Gæa (Earth), amongst whom were Kronos (see SATURN), Oceanus, Rhea, &c. Instigated by their mother, the Titans, headed by Kronos, rose against their father, emasculated and deposed him, and liberated their brothers, the Hecatoncheires (Hundred-handed) and the Cyclopes (q.v.), from Tartarus. Kronos, being made king, married his sister Rhea. Zeus, the son of Kronos and Rhea, waged against his father and the other Titans a ten years' war, in which the Titans were defeated and hurled into Tartarus. During the war Zeus and his allies occupied Mount Olympus in Thessaly, his opponents being encamped on Mount Othrys. The name of Titans is also given to the descendants of the Titans, such as Prometheus, Hecate, Helios, Selene, &c. See GIANTS, ZEUS.

Tithe (A.S. *teotha*; Lat. *decima*, sc. *pars*) means etymologically a tenth, historically a tenth part of the titheable produce of the land paid to the clergy. The payment of tithe to the clergy originated in the recognition of a moral and religious duty. The discharge of this acknowledged obligation acquired the force of custom, then received the sanction of ecclesiastical law, and finally passed into the national jurisprudence of England and other Christian countries.

The first recorded instance of the payment of tithe is the offering of Abraham to Melchisedec (Gen. xiv. 20); the second precedent is the vow of Jacob at Bethel (Gen. xxviii. 22). The consecration of a fractional portion of the produce of the land to the uses of the ministers of religion formed part of the Mosaic law. The tribe of Levi were maintained from this source, not having lands assigned to them like the other tribes. Neither patriarchal usage, nor precedents of Mosaic law, nor the Levitical economy were binding on Christians; but they doubtless suggested to the clergy the precept, and to the people the practice, of paying tithes to the ministers of religion. The system is not specially enjoined in the New Testament, and no claim to tithes is urged by the Christian clergy as representatives of the Levitical priesthood. In the enthusiastic bounty of early Christianity voluntary offerings sufficed. Some evidence does exist in the ante-Nicene Fathers that tithes were held to be due under the gospel as well as under the Mosaic law; on the other hand, Selden is possibly right in maintaining that the custom of paying tithe cannot be traced before the 4th century. Whether this be so or not is immaterial. At the end of the 4th century the evidence is overwhelming (Hilary, Ambrose, Chrysostom, Jerome, Augustine) that the moral and religious duty of paying tithes was recognised, and had acquired the force of custom. As a moral and religious custom the payment of tithes was enjoined by the public acts of councils and churches, and enforced by moral and religious sanctions (e.g. Councils of Tours, 567; Mâcon, 589; Rouen, 650; &c.). The last stage was reached when the state added the civil sanction to the ecclesiastical sanction. In doing so the state recognised the already accepted customary duty, and the corresponding customary rights. It created no new burden; it appropriated no part of what had hitherto been a public fund or public revenue. On the Continent the attachment of legal sanctions to ecclesiastical customs dates from Charlemagne's legislation in 779 and 787. Henceforward tithes were enforced by temporal penalties.

Before Augustine landed in Kent (597), the custom of paying tithes had been enjoined by the public acts of continental councils. As a duty the payment of tithes was preached by the first missionaries; as a custom it was speedily established by their successors. But it was not till 785 that the custom was enjoined by ecclesiastical legislation. In 785 two Italian bishops were sent by Pope Adrian I. to recommend twenty-nine Latin injunctions to the observance of the Anglo-Saxon Church. Among them was one injunction which urged the payment of tithes as a means of securing to the payer the blessing of God. Thus the customary discharge of a recognised religious

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duty was for the first time enforced in England by the public act of an ecclesiastical council.

This ecclesiastical injunction was subsequently confirmed and extended by royal orders in episcopal councils, in national synods, and in proclamations of peace. But it was not till 970 that the state recognised the customary duty and its corresponding customary right by adding the civil to the ecclesiastical sanction. It is now agreed that the so-called grant of King Offa is an idle story relating to Peter's Pence, and that the so-called grant of King Ethelwulf rests on a misconstruction of a document which has no reference to tithes. No law, no charter, no authentic public document exists by which the state professes to confer the right to tithes upon the church. But the laws of King Edgar (970) attached a legal punishment to neglect of the customary and religious duty of paying tithes, and provided means of enforcing the corresponding customary right by temporal penalties. These laws were subsequently confirmed by successive sovereigns, though it was not till after the Conquest that the payment became general. The process by which tithes grew from a moral into a legal duty does not explain their special allocation as the local endowments of parishes. In their appropriation as part of the parochial system three stages may be distinguished: (1) before 970; (2) from 970 to the end of the 12th century; (3) from 1200 onwards.

(1) *Before 970.*—During the first three centuries of the Anglo-Saxon Church there was in each diocese one common treasury, into which were paid the tithes and other offerings of the faithful. As to the distribution of these funds by the bishop, different usages prevailed in different parts of western Christendom. In the Roman dioceses the customary division was fourfold: (1) the clergy, (2) the poor, (3) the fabrics of churches, (4) the bishop. In some of the French and Spanish dioceses the division was threefold, the bishop being omitted. What usage prevailed in the Anglo-Saxon Church is unknown. No division, quadripartite or tripartite, was ever enjoined by law or canon in England.

(2) *From 970 to end of 12th century.*—In this transition period the parochial system grew up, and local appropriations were made to particular churches out of the common fund. Edgar's legislation (970) shows that the parochial system was already growing. His legislation points to the fact that landowners were building churches on their estates for their own and their tenants' benefit, and were endowing them with some portion of the tithe, which they otherwise paid to the diocesan treasury or to the nearest monastic or conventual establishment. It distinguishes three kinds of churches: (1) the mother-church, generally monastic or conventual; (2) churches with burial-grounds attached, in private patronage on the estates of private landowners; (3) churches similarly situated, but without burial-grounds. It recognises the general presumption in favour of paying to the mother-church the tithe of the district which it served, but if there was a church of the second class within the district it was entitled to a portion of the local tithe. In these churches we have the original type of modern parish churches. By degrees they multiplied, and, as they were built, bishops insisted upon their endowment with a portion of the local tithe as a condition of consecration. Districts were attached to them, which were generally conterminous with the estate of the founder, and which became the parish. The same process was going on not only on lay estates, but on the estates of bishops and other ecclesiastical corporations. Thus the parochial system gradually became uniform, and by a series of acts, which in each case were distinct and voluntary on the part of the landowner, the local tithes became appropriated without any legislative enactment to parish churches. No general law, no legislative enactment, effected the endowment; but by express particular grants, of which, in the shape of consecration deeds, several remain to the present day, each church was separately endowed.

(3) *From 1200 onwards.*—This date makes a dividing line in the growth of the parochial system, because by that time the system was almost universal, and because the legal presumption had arisen that, in the absence of proof to the contrary, the tithes of all titheable produce within the parish belonged of common right to the rector. The decrees of the Lateran Council, 1179–80, made two important steps, according to Selden, towards the growth of the system. Up to that date landowners had been free to pay the tithes as they pleased: they might, and did, 'appropriate' them to churches, monasteries, or capitular bodies; they might 'appropriate' them to themselves or other laymen; they might, and did, sell them to the church for money or other valuable consideration. Out of this power had arisen all the endowments of parish churches and monasteries with tithes which took place between the 10th and 13th centuries. From 1180 onwards no new titles of this kind could be created without the consent of the bishop, and the loss of the power of appropriation, together with the legal presumption in favour of the rector's title, provided for the expansion of the system on stereotyped lines. The other change in 1180 was this. Parish priests were originally nominated and invested by lay patrons. Bishops did not institute; hence when vacancies occurred in manorial parish churches patrons could not be compelled to fill them up. The council decreed the necessity of episcopal institution, and established the right of the bishop to supply vacancies after the lapse of a certain delay. The almost universal establishment of the parochial system, the legal presumption in favour of the rector, the episcopal institution, and the bishop's right to supply vacancies completed the organisation of parishes and provided for present and future appropriations of local tithes to parish churches.

Rectories together with tithes might be 'appropriated' to monastic or nonparochial corporations. The appropriators performed their duties by vicars. At the dissolution of the monasteries the rectorial tithes which had belonged to the dissolved communities passed to the crown, and were from time to time granted out to subjects, who became lay rectors or 'impropriators' as they were called to distinguish them from the original 'appropriators,' who must of necessity have been spiritual. The Tithe Commutation Act of 1836 provided for the commutation of tithes in England and Wales into a money payment or rent-charge. Though the annual payment varies with the septennial average price of corn, it is fixed in the sense that the amount payable in each year is calculated upon a rent-charge or fixed valuation. The effect of this act is to render the old distinctions between great and small tithes, prædial, mixed, and general tithes, and between the various modes of payment by 'moduses' matters of antiquarian knowledge. The value of the tithes commuted in 1836 to tithe rent-charge was at par value £4,053,985, 6s. 8½d. Of this sum £962,289, 15s. 7½d. is payable to lay impropriators, leaving £3,091,695, 11s. 1½d. for ecclesiastical owners. Of this latter sum £678,987, 1s. 1½d. is payable to Ecclesiastical Commissioners. The remainder, £2,412,708, 9s. 11½d., is payable to parochial incumbents. At the present values this sum is worth about in round numbers £1,800,000. To this sum may be added about £8000 for *extra-*

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ordinary tithe in Kent and Cornwall. In Ireland the settlement was effected by a general commutation of tithe into a money rent-charge, regulated by a valuation of the tithes (one-fourth being deducted for the cost of collection), and payable by the proprietors, who should receive it from the occupiers of the land. By the Irish Church Act, 1869, this rent-charge became vested in the commissioners of church temporalities, with power to sell such rent-charge to the owner of the land charged therewith at twenty-two and a half years' purchase. Power is also given to such purchaser to pay by instalments for fifty-two years, at the rate of 4½ per cent. on the purchase-money, deducting the estimated charge for poor-rate; the rent-charge being extinguished at the expiration of the fifty-two years. The Extraordinary Tithe Act, 1886, frees lands not at present cultivated as hop-ground, orchard, fruit plantation, or market-garden, from liability to the separate tithe which, under the Act of 1836, could be claimed as extra-ordinary. It also provides for the redemption of the extraordinary tithe in existence upon the land actually under cultivation. The Tithe Rent Charge Recovery Act of 1891 has not materially affected the principle of the Act of 1836. But instead of the old remedy of distress by the tithe-owner, it substitutes a process through the county court; instead of permitting the tenant to be the conduit-pipe of the landowner's payment, it makes the landowner alone liable; instead of the corn-averages absolutely determining the amount of tithe rent-charge which is payable, provision is made in certain cases for the reduction or the suspension of payment.

In 1891 a Royal Commission was appointed to consider the redemption of tithe rent-charges. The Commission has reported *inter alia* in favour of the compulsory redemption of tithes up to the value of 40s., of the abolition of the existing *minimum* of twenty-five years' purchase, of the principle of allowing the parties to make their own bargains subject to the approval of the Board of Agriculture. See TEINDS, ADVOWSON; and works on the history of tithes by Easterby, Jones, Clarke, Lord Selborne (1888), and on the tithe acts by Whalley (1838; new ed. 1883), Bolton (1886), Chambers (1891), Studd (1891), and Thring (1891).

Tithing. See HUNDRED. The tithing man in England was a kind of constable. In New England he was a town-officer, yearly elected to exercise a moral supervision, or to enforce attendance at public worship.

Tithonus, son of Laomedon, brother of Priam, and spouse of Eos, the goddess of Morn. The story is that Eos, in asking immortality for her spouse, forgot to ask at the same time eternal youth, so that in his old age he became completely shrunk and decrepit, whereby his 'cruel immortality' was rendered a burden to him.

Titian. The life of Titian is the longest in the biographies of artists, and it was also one of the most productive, as he worked quickly and energetically, enjoyed almost perfectly regular health, and produced regularly, except when his labours were occasionally interrupted by festivities or by travel. The consequence is that the biography of Titian is one of the most difficult to write laconically. If too much compressed, it would become a mere list of dates. In this brief notice there must be many omissions. It will be divided into three parts, treating separately of the artist's life, his patrons, and his works.

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The Anglicised form of the name is obtained by dropping the final *o* from Titiano, which was the artist's most common signature, though he sometimes wrote Tiziano, occasionally Ticiano, and rarely Tician. The English form, therefore, is nearer to the most frequent signature than the French *Titien*. The modern Italians have preferred Tiziano. The painter's contemporaries gave various forms to his name from uncertainty or carelessness, as for instance Tuciano.

Titiano Vecellio was descended from a respectable but not wealthy family. The surname Vecellio or Vecelli appears to have been originally a Christian name, Guecello, but at the time of the painter's birth it was fixed as a surname, and Tiziano afterwards became common in the family. The date of the painter's birth is not quite positively fixed, except that the year is indicated by his own statement on August 1, 1571, that he was then an old man of ninety-five, so he cannot have been born later than 1477. His birthplace was close to the castle of Cadore, in a very mountainous region, and his continued attachment to the country of his birth is proved by his frequent visits to it, and by his numerous sketches of its scenery. Titian's father, Gregorio Vecellio, was a brave officer who filled various important civil functions in his native place, and was greatly respected both for wisdom and valour, but he was a poor gentleman. Gregorio sent his little son to Venice at the age of ten, to the house of an uncle, who saw that he had a turn for art, and sent him to Zuccato, a mosaicist, and afterwards to Gentile Bellini. That painter disapproved of his pupil's rapidity, so the boy (who seems to have enjoyed a good deal of independence for his years) first went to Giovanni Bellini, and afterwards to Giorgione. This is evidence that as a quick and intelligent little boy and an observant youth Titian actually saw the transition from comparatively primitive to advanced art at the moment when it took place, and that he adopted without hesitation for himself what were then the most modern and advanced principles.

The rapidity with which Titian absorbed all that was known at Venice about the art of painting is proved by the simple fact that he produced a masterpiece at twenty-three, and very soon had plenty of employment, both in fresco on public edifices and in oil. In 1511 he was painting fresco at Padua, and in 1516 he made his first visit to Ferrara. There are no events in his life outside of his work till 1524, when he had a fever that prostrated him and threatened to become chronic. The date of Titian's marriage is unknown, but the birth of his eldest son, Pomponio, is believed to have occurred in 1525. All we know is that he had a wife whose name was Cecilia. He contrived, by influence, to obtain ecclesiastical preferment for Pomponio though a mere child, the work being done by a curate. Afterwards he had two other children, Orazio and Lavinia. Pomponio turned out badly; Orazio, a painter, survived Titian a few months; and Lavinia married. Titian's wife died in 1530, to his intense grief. In the year following he went to live in the fields to the north-east of Venice, where he had a large house with a fine garden, probably going down to the water's edge, and a view of the lagoon. The year 1532 is of importance, as Titian became acquainted with the Emperor Charles V., who made him a count palatine, with other titles, a rank which empowered him to appoint notaries and judges, and legitimise the illegitimate offspring of persons beneath baronial rank. He was also made a Knight of the Golden Spur, with insignia, and the *entrée* at court, and his children were all ennobled. In 1536 he went with the Duke of Mantua to greet Charles V. at Asti. In 1543 Titian met Pope Paul III. and Charles V. at Busseto, where he was the guest of Cardinal Farnese. Two years afterwards

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he visited Rome, where he was welcomed by Paul III., and in 1546 he returned to Venice. His vigour at the age of seventy was proved by a winter journey across the Alps to Augsburg, where he joined the court of Charles V. He returned to the court at Augsburg in 1550, and probably followed it to Innsbruck in 1551. In 1554 the troubles with his son Pomponio reached a climax, and Titian asked to substitute a nephew for him in the sinecure canonry of Medole. An interesting example of the protection of copyright is a patent granted in 1566 by the Council of Ten, recognising Titian's copyright in prints from his own works. The later part of his life was chiefly occupied in working at Venice for Philip II. of Spain. He still retained energy for work, as is proved by his undertaking in 1576 a large picture for the Franciscans. In the same year he died of the plague, at the age of ninety-nine, and was buried with much public honour, and by daylight, in the chapel of the Crucified Saviour at Frari, a striking exception to the usual practice with regard to persons dead of the plague. Titian's son, Orazio, died of the same disease a few months later in a hospital.

Titian was extremely fortunate in his patrons. The Venetian government acted generously towards him, and on the whole with great indulgence, considering his negligence and delays. He had a great love of pensions, privileges, and sinecures, and was always trying to get them for himself or his relations. He was perpetually begging, and his access to great people gave him excellent opportunities. He was patronised by people of the highest rank, including Doges of Venice, reigning Dukes of Ferrara and Mantua, several cardinals, princes, kings, Pope Paul III., and the great Emperor Charles V. All these personages treated Titian with the greatest kindness and consideration, but although a gentleman in his manners, and a courtier in his correspondence, he sometimes, by negligence, tested their patience very severely. His friendship with Charles V. was intimate, and lasted, in spite of distance, until the emperor's death. Titian's character was not comparable in dignity to that of Michaelangelo; it was the nature of a polished self-seeking courtier; but he was an affectionate husband and father, an amiable and sociable companion, and a warm friend. There is no evidence that Titian had much learning—his art would not leave time for that; but he had derived a rare and valuable culture from his immense experience of the world.

Titian's works are so numerous that it is impossible to catalogue them here. He was much in request as portrait-painter, and painted most of the great people he knew, several of them repeatedly. His religious pictures are numerous and magnificent, some of them on a large scale, and like other artists of the Renaissance he frequently chose mythological subjects. Some of his finest works are poetical or allegorical. The supreme rank amongst painters is sometimes assigned to Raphael and sometimes to Titian. Raphael's claim to it is in the extreme grace and refinement of his mental conceptions and in the beauty of his style as a draughtsman; Titian's claim is founded more essentially on the pictorial qualities, and especially on the technical excellence of his painting, which combines in a most extraordinary degree the richest surface with the most magnificent colour. These technical qualities were accompanied by much grandeur of conception and nobility of style. The following is a chronological list of some of Titian's most important works.

'Sacred and Profane Love' (the title 'Artless and Sated Love' has been proposed by Messrs Crowe and Cavalcaselle), about 1500; the 'Pesaro Altarpiece,' at Antwerp, about 1503; 'Doge Marcello,' at the Vatican, 1508; 'Christ of the Tribute-money,' Dresden, 1508; 'The Three Ages,' Ellesmere Collection, 1518; 'Noli Me Tangere,' National Gallery, 1518; 'Bacchus and Ariadne,' National Gallery, 1520; 'Titian and his Mistress' (so called), 1513; 'Altarpiece of St Peter Martyr,' 1530, destroyed by fire at Venice in 1867; 'The Rest in Egypt,' Louvre, 1530; 'A Summer Storm,' Buckingham Palace, 1534; 'The Battle of Cadore,' for the council-chamber at Venice, 1537, destroyed by fire in 1577; 'The Farnese Family Picture,' 1545; 'The Danae of Naples,' 1545; 'The Farnese Venus and Adonis,' 1547; portraits of Philip of Spain, 1550; 'Venus and Adonis,' National Gallery, 1554; 'Martyrdom of St Lawrence,' Gesuiti, Venice, 1558; 'Jupiter and Antiope,' Louvre, 1561; a second 'Peter Martyr,' 1567.

Titian is well but not extensively represented in the National Gallery by five pictures, and in the Louvre by twenty-two. Other public collections are rich in Titians. At Dresden there are twelve, at Vienna thirty, and at Madrid forty in the Museum, with many others at the Escurial. His drawings are interesting, especially his numerous pen-sketches, executed in a bold and simple but very expressive style of his own. They afford strong evidence that his lines, which were intended to be vertical, inclined very much to the right. In all his finished works he corrected this tendency with the plummet.

Many biographies of Titian have been written, from that by Vasari to the French one by Charles Blanc; but although the materials were in reality abundant, they were scattered till Crowe and Cavalcaselle brought them together for their invaluable work, the *Life and Times of Titian* (London: Murray, 2d ed. 1881). Between Vasari and Crowe we have a biography by Ridolfi, condensed by Sir A. Hume in an English edition, published in 1829. The most important step towards a life of Titian was taken by Taddeo Jacobi early in the 19th century. As a descendant of the Vecelli family he was interested in his ancestors, and collected materials for their history, but not having a literary turn he transferred them to Stefano Ticozzi, who published his book in 1817. That of Northcote is founded upon it.

Titicaca, LAKE. See PERU.

Titiens, or TIETJENS, TERESA, one of the greatest of modern operatic singers. She was born at Hamburg, of Hungarian parents, 18th July 1831, and made her début at Altona in the character of Lucrezia Borgia in 1849, taking at once a very high position on the lyric stage; at Frankfort and Vienna she was even more warmly received; and her first appearance in London in 1858 was quite a triumph. Among her most famous impersonations were Norma, Semiramide, Fidelio, Margarita, and Ortrud (in *Lohengrin*). She visited America in 1875. The great volume and purity of her voice, and her energetic but dignified acting, combined to make her an unrivalled representative of strong dramatic parts. She was almost equally admirable in oratorio: Sir Julius Benedict wrote *St Cecilia* and other works specially for her. She sang for the last time in public in May 1877 in *Il Trovatore*, and died 3d October of the same year.

Titlark. See PIPIT.

Title-deeds are the evidences of ownership of real property. Each owner is supposed to be in possession of his own, either by himself or his solicitors; and the ownership of the title-deeds passes along with that of the lands themselves. See REGISTRATION.

Titles, designations to which certain persons are legally entitled, in consequence of possessing particular dignities or offices; see ADDRESS (FORMS OF), PRECEDENCE, MAJESTY, ROYAL FAMILY, DUKE, MARQUIS, &c.; also COURTESY TITLES.

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Though most European countries have their dukes, marquises, counts, viscounts, and barons, these often differ considerably in rank from the seemingly corresponding titles in Britain, and the English rules and practices regarding title are not applicable abroad. The complicated system of titles by law, and still more by courtesy, which prevails in England is a source of endless perplexity to such foreigners as endeavour to make themselves acquainted with British usages. For a title to Orders, see Vol. VII. p. 630; and for the subject of titles generally, see Edward Solly's *Index of Hereditary Titles of Honour* (Index Soc. 1879).

Titmouse. See TIT.

Titular, one who enjoys the bare title of an office, without the actual possession of that office. Thus, the English kings styled themselves kings of France from the time of Henry IV. down to 1800. In English Ecclesiastical Law a titular is a person invested with a title in virtue of which he holds a benefice, whether he performs its duties or not. In Scotland the term was used by laymen invested at the Reformation with church lands; see TEINDS. Leo XIII. altered to 'titular bishops' the old title of bishops *in partibus* (see Vol. VI. p. 149).

Titus, the Roman prænomen but the usual name for the eleventh of the twelve Cæsars, Titus Flavius Sabinus Vespasianus, the eldest son of Vespasian and Flavia Domitilla, born at Rome, 30th December 40 A.D. He was brought up at the court of Nero along with Britannicus, and early served with credit as tribune in Germany and Britain, and in Judæa under his father. On Vespasian's elevation to the throne Titus was left to prosecute the Jewish war, which he brought to a close by the capture of Jerusalem after a long siege (70). Both father and son enjoyed a joint triumph in 71. About this time Titus received the title of Cæsar, and took a share in the work of government. He gave himself up to pleasure, and his attachment to Berenice, the daughter of Herod Agrippa I., grievously offended the Romans. But no sooner had Titus assumed the weight of undivided power (79) than his whole character became changed. The very first act of his reign was to put a stop to all prosecutions for *læsa majestas*, and to decree heavy punishments against informers. He assumed the office of Pontifex Maximus in order to keep his hands free from blood. He completed the Colosseum and built the baths which bear his name, and lavished his beneficence upon the sufferers from the great eruption of Vesuvius, which overwhelmed Herculaneum and Pompeii (79), and the great three days' fire at Rome, followed by pestilence the year after. Titus was now the idol of his subjects, the 'love and delight of mankind.' He loved to give, and the characteristic story is told that one night he exclaimed 'I have lost a day' when he remembered that he had given nothing away that day. But unhappily he died suddenly at his patrimonial villa in the Sabine country (September 13, 81), not without the suspicion that he had been poisoned by his younger brother Domitian.

Titus, one of the companions of the apostle Paul, is (apart from the epistle with which his name is associated) mentioned only in 2 Cor. and Gal. He was a Greek, and remained uncircumcised after his conversion. He accompanied the apostle from Antioch to Jerusalem, where the latter took part in the church council held to discuss the Christian privileges of Gentiles. He was thrice sent to Corinth: on the first occasion, from Ephesus, as bearer of a no longer extant epistle (2 Cor. ii. 3, 4; vii. 8, 12); afterwards, from Macedonia, with the second canonical epistle; and a third time to promote the collection in Corinth for the poor Christians of Judæa. According to Tit. i. 5 he accompanied the apostle to Crete, and was left by him there. Ecclesiastical tradition makes Titus 'bishop' of Crete. For the canonical epistle to Titus, and works thereon, see TIMOTHY (EPISTLES TO).

Titusville, a city of Pennsylvania, on Oil Creek, 120 miles by rail SSW. of Buffalo. It contains oil wells and refineries, and, though it possesses also sawmills, ironworks, &c., its prosperity is mainly dependent on the oil-trade. In June 1892 it suffered much from a great flood. Pop. (1859) 300; (1880) 9046; (1890) 8073.

Tiumen, a town and important commercial centre of western Siberia, 90 miles SE. of Tobolsk, on the Tura, an affluent of the Tobol, and so of the Irtish and Obi. Connected by rail with Perm and the Russian system, it is on several important trade routes both by land and water; and large quantities of leather, carpets, soap, candles, and pottery are manufactured and exported throughout Siberia, the Ural countries, the Kirghiz Steppes, Khokand, Bokhara, and China. It has a large scientific and technical school, and there is a great fair in January. Tiumen contains an important exile forwarding prison (see *Century Magazine*, June 1888). Pop. 15,590.

Tiverton, a municipal borough of Devonshire, 14½ miles N. by E. of Exeter, stands pleasantly on an eminence between the confluent Exe and Loman, and got the name *Twy-ford-ton* from two fords upon those two rivers. Little save the gateway remains of the castle of the Earls of Devon, built in 1106, and dismantled after its capture by Fairfax in 1645. St Peter's, a Perpendicular church of the 15th century, was mostly rebuilt in 1855; and other edifices are the town-hall (1864), late Venetian in style, with a tower 80 feet high, the market-house (1830), the infirmary (1852), the Greenway almshouses (1517), Waldron's almshouses (1579), and the grammar-school (1604), which was founded by Peter Blundell (1520–1601), and has an endowment of £1100 a year. Among its scholars have been Bishops Bull, Hayter, Conybeare, and Temple, A. Hayward, R. D. Blackmore, and his hero, John Ridd. New school buildings in the Tudor style were erected in 1880 at a cost of £20,000. Tiverton was a great seat of the woollen trade from 1353 till 1700 and afterwards, but lace-making is now its staple industry, the lace-factory, employing 1500 workpeople, having been established in 1816 by Mr John Heathcoat (1783–1861), inventor of the bobbin-net frame. Cosway, the painter, and Mrs Cowley, dramatist, were natives; whilst Lord Palmerston for thirty years (1835–65) represented Tiverton, which was chartered by James I., but lost its two members in 1885. Pop. (1851) 11,144; (1871) 10,025; (1891) 10,892. See works by M. Dunsford (1790) and W. Harding (2 vols. 1844–47).

Tivoli, a town of Italy, 18 miles E. of Rome by rail and steam-tramway, on the slope of the Sabine hills and the river Teverone (ancient *Anio*, q.v.). Here works for the electric lighting of Rome were inaugurated in 1892. Under its ancient name of *Tibur*, it was the favourite summer-resort of the wealthy Romans; and it retains many monuments of antiquity. In a commanding position above the falls of the Anio rises the so-called Sibyl's temple, circular, and in good preservation; the church of San Giorgio is an ancient temple; there are extensive remains of the Emperor Hadrian's magnificent villa, the villa of Mæcenas, mausoleums, aqueducts, baths, &c. Near Tivoli is the famous Villa d'Este, dating from 1551. The name of Tivoli is often used elsewhere (as in Germany) as a synonym for places of entertain-

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ment, beer-gardens, &c. Pop. 9370. Tibur was a town before the building of Rome, and belonged to the Latin confederation. At a later date Mæcenas, Scipio, Æmilianus, the famous Marius, Metellus Numidicus, and Munatius Plancus had their Tiburtine villas. Horace preferred Tibur to all other places of resort, and had a country-house in the neighbourhood.

Tlaxcala, the smallest state of Mexico, on the plateau of Anahuac, nearly surrounded by Puebla, and touching Mexico state on the west. In Aztec days Tlaxcala was the seat of an independent republic, which survived for a time under the protection of the Spaniards. Area, 1506 sq. m.; pop. (1890) 138,478. The capital, Tlaxcala, stands 7300 feet above the sea, and has some manufactures of woollens. Pop. 4300.

Tlemcen', a town of Algeria, 80 miles SW. of Oran, stands on a rock in an undulating country, with a delightful climate, and surrounded by olive-plantations and vineyards. Pop. (1891) 19,832, of whom 2572 are French by birth or naturalisation, and nearly 5000 Jews.

Toad (*Bufo*), a genus of amphibians, typical of the family Bufonidæ, represented in Britain by two species—the Common Toad (*Bufo vulgaris*) and the Natterjack (*Bufo calamita*). Toads are distinguished from frogs by the absence of teeth, by the roughness of the skin, by peculiarities in the breastbone, by the shorter hind-legs, and by the dilatation of the tranverse processes of the sacral vertebræ.

1. Common Toad (*Bufo vulgaris*); 2. Natterjack (*Bufo calamita*).

The common toad is a shy, nocturnal animal, hiding during the day in dark, damp places, crawling about at night in search of insects, grubs, slugs, worms, and the like. Its appearance is familiar—a dirty brownish-gray colour, a warty skin, a flat head, swollen parotid glands above the ears, bright jewel-like eyes with a transverse pupil, slightly webbed toes. They are heavier and clumsier than frogs, and cannot leap nearly so far. Hardy and tenacious of life, they often live for many (even forty) years, and can endure prolonged fastings. According to Buckland's experiments, a toad cannot live for two years without food and air; still, though tales of toads disentombed from blocks of rock must be discredited, there is no doubt that they can survive for a long time in very disadvantageous conditions. During winter they hibernate in the mud or in holes. In spring they pair, and the females lay in the water-pools their numerous ova in gelatinous strings 3 or 4 feet in length. The tadpoles are smaller and darker than those of frogs, and do not accomplish their transformation into terrestrial toads until autumn. Though toads cannot spit poison, the secretion of their skin glands contains a poisonous substance (phrynin), acrid enough to be felt on tongue or eyes, and probably conducive to the safety of the toads. Although regarded with disgust by the ignorant, the toad is an inoffensive and useful animal, and destroys injurious insects.

The Natterjacks or Rush Toads are rare in Britain, though Gilbert White found them more numerous than common toads in his garden. 'It is of a light yellowish-brown colour, clouded with a dull olive, and there is a bright yellow line running down the back. It is found in dry situations. It is less timid than the common toad, and its eyes are more prominent, its warts larger, its tadpoles smaller, their metamorphoses much shorter.' It has a strong repulsive smell. The gait is more like walking or running than the crawling of the common toad.

The genus Bufo includes over seventy species. These are widely distributed over most parts of the continents, but are most abundant in tropical regions. The largest, *B. marinus* of tropical America, measures 8 inches in length. Some, e.g. *B. typhonius*, have bony ridges on the head; some, e.g. *B. compactilis* of Mexico, have a shovel-like hand modified for digging. A really venomous toad is found in the Argentine Republic (see Hudson's *Naturalist in La Plata*, 1892). Among the other genera may be noted the burrowing Rhinophrynus of Mexico, the Australian Pseudophryne, the Cuban Peltaphryne, the Central American Cranopsis, which differ considerably as regards the degree of ossification in the skull. Among the amphibians which are more nearly related to toads than to frogs are the Horned Toad (Ceratophrys), the Tree-frogs (q.v.; Hylidæ), the Fire-bellied Toad (*Bombinator igneus*) common in Germany, and the 'midwife toad' (*Alytes obstetricans*) of western Europe. See AMPHIBIA, FROG.

Toadflax (*Linaria*), a genus of plants of the natural order Scrophularineæ, very closely allied to Snapdragon (q.v.), from which genus it is distinguished chiefly by the spur at the base of the corolla, and the capsule opening by valves or teeth, not by pores. The species are herbaceous perennials or annuals, natives chiefly of the colder and temperate parts of the Old World, of which about 150 have been described. Some of them are natives of Britain, of which the most common is *L. vulgaris*, a species with erect stem 1 to 3 feet high, glaucous linear-lanceolate leaves which thickly cover the stem, and terminal spikes of yellow flowers. It grows in hedges, the borders of cornfields, &c. It possesses purgative and diuretic properties, and a decoction of it is used as a fly-poison; but it is regarded as a troublesome weed by farmers. It has found its way, probably along with grain or other grass seeds, into the United States. A very remarkable monstrosity is sometimes seen in this plant, to which the name *Peloria* has been given, the flower presenting five spurs and five usually imperfect stamens. *L. Cymbalaria*, the Ivy-leaved Toadflax, or the Mother of Thousands, a favourite window-plant with cottagers in many parts of Britain, is frequently to be seen clothing old garden-walls.

Toadstool, a name for almost any large umbrella-shaped Fungus (q.v.), but as a rule understood to refer to a poisonous form as distinguished from a Mushroom (q.v.).

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Toast (Late Lat. *tosta*, 'a piece of toast,' from *tostus*, 'scorched' or 'parched') is the name given to bread dried and browned before the fire. So early as the 16th century toasted bread formed a favourite addition to English drinks. Sack was drunk with toast, and so was punch. The practice of drinking healths, particularly that of an entertainer, is one so natural, so likely to spring up spontaneously, that it is impossible to say when it began. Certain it is, however, that it received an artificial development owing to the prevalence of convivial habits in the 17th century. Then it became the fashion to drink not to the health of entertainers only, but to that of each guest, of absent friends, and more especially of the unmarried woman whose attractions were most generally acknowledged. It also became the custom to describe a woman whose health was so drunk as herself 'a toast'—a custom whimsically referred to one particular incident in the *Tatler*, No. 24 (1709). Whatever may be the origin of the use of the word 'toast' in this sense, we now apply it not only to any person, but to any sentiment mentioned with honour before drinking. Both French and Germans have adopted the word from us. See Chambers's *Book of Days;* Valpy's *History of Toasting* (1881); and six long lists of toasts and sentiments in *Notes and Queries* (1888).

Tobacco. The origin of the word is uncertain, but it is generally supposed to have been derived from *tabaco* or *tabac*, the West Indian or Carib name of the instrument in which the leaves were smoked by the natives. The plant belongs to the genus Nicotiana, of the order Solanaceæ. The various species are mostly herbaceous, rarely shrubby, generally with large broad leaves, and covered all over with small clammy hairs. There are said to be in all about fifty species of the plant, with many varieties belonging to each, but of these three stand out in importance apart from the rest. The first of them is the *Nicotiana tabacum*, or American tobacco, which furnishes the bulk of the tobacco of commerce. It is a handsome plant, standing sometimes 6 or 7 feet high, with large oblong leaves which embrace the stem at their base, and with a pink or rose-coloured flower. It is now grown in all parts of the world, and the commercial American tobacco is almost exclusively of this species, although the varieties differ so widely as sometimes to give rise to a doubt as to whether they are not of different species. It includes, amongst other kinds, the famous Virginian, Kentucky, Maryland, and Havana tobaccos.

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Fig. 1.—American Tobacco (*Nicotiana tabacum*).

The *N. rustica* is a smaller plant, about 3 or 4 feet in height, with leaves of a more ovate form which are attached to the stem by stalks, and with a green flower. It is a native of America, but is now cultivated chiefly in Europe, Asia, and Africa, and furnishes the Turkish, Syrian, and probably the Latakia tobaccos of commerce. It is a hardy plant, and ripens earlier than *N. tabacum*. It is called green tobacco, because the leaves in drying do not entirely change to brown.

The *N. persica*, which furnishes the famous mild Shiraz tobacco, is a native of Persia, and has oblong stem-leaves and a white flower. The *N. finis*, popular in the private gardens of England, is often a long straggling plant with small leaves widely separated, but by continually nipping the stem it may be made to assume a bushy form. The flower is white and droops somewhat during the day, but towards sunset it opens out, becomes firm, and then emits for the remainder of the evening a powerful and delicious perfume, which is, of course, quite unlike that of prepared tobacco.

Fig. 2.—Syrian Tobacco (*Nicotiana rustica*).

History.—It is a matter of conjecture whether the use of tobacco as a narcotic was known in the East before the discovery of America. It is possible that the Chinese had long been accustomed to smoking it. The habit, however, did not spread to surrounding countries; whereas on the introduction of tobacco into Europe from America its use rapidly extended and soon became very prevalent in Oriental countries. The custom was in full force in America when that continent was first discovered by Columbus. The natives of the West Indies at that time made the tobacco into cylindrical rolls wrapped in maize-leaf.

Fra Romano Pane, whom Columbus had left behind in Hayti, in 1496 wrote Peter Martyr an account of tobacco; but an exact description of the plant was first given in 1525 by Gonzalo Hernandez de Oviedo, viceroy of San Domingo, who also introduced it into Europe, and cultivated it as an ornamental plant in Spain. Its medicinal properties caused its cultivation to spread to other European countries. Jean Nicot, French ambassador at Lisbon, purchased some seed there which had just been brought over from Florida, and sent some of it home. In 1561, upon his return, he presented some of the plants to Catharine de' Medici. Various names were given to the plant at this time, but finally it was designated *Nicotiana*, and this word, which has been retained by botanists, gives rise to Nicotine, the name of the characteristic alkaloid of the plant. The custom of smoking the dried leaves quickly succeeded the cultivation, to be followed soon after by the habit of snuffing—luxuries at first confined to the wealthy. Therewith commenced a literary warfare, not yet ended, in which the vituperators of the 'stinking habit' produced most of the writings. Popes Urban VIII. and Innocent XI. issued decrees. Sultans of Turkey made smoking a crime punishable by the offenders having their pipes thrust through their noses. In Russia the noses of smokers were cut off. Into England tobacco was

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first brought by Sir John Hawkins in 1565. Probably Sir Walter Raleigh had much to do with its popularity by encouraging its growth in 1586, but he was not the introducer; we read in Lobel's *Stirpium Adversaria Nova* (Lond. 1571) that tobacco was at that time successfully cultivated in England and Scotland.

In 1602 appeared the first book against its use, *Work for Chimney Sweepers*. In the same year came *A Defence of Tobacco*; and in 1604 the famous *Counterblaste to Tobacco* of James I., in which that monarch expressed his disapproval of smoking in the following terms: 'A custom loathsome to the eye, hateful to the nose, harmful to the brain, dangerous to the lungs, and in the black, stinking fume thereof nearest resembling the horrible Stygian smoke of the pit that is bottomless.' In 1614 the Star-chamber imposed a tax on tobacco, and at about this time stipulations began to appear in respect to responsible appointments, one of the necessary qualifications of a teacher being that he should be 'no puffer of tobacco.' All this proved of little or no avail, and plantations sprang up in all parts of the country. Under Charles I. denunciations continued to issue forth until it was discovered that by taxation a considerable addition to the revenue of the crown could be realised. It was Charles II. who forbade the cultivation in England, and placed a duty on the imported article. Shakespeare makes no reference to the use of tobacco. Ben Jonson, knowing the prejudice of James I., roundly abused the weed in his *Metamorphos'd Gypsies* (1621).

Consumption and Use.—The consumption of tobacco at the present time is greater than it ever was. Thus the annual consumption per head of population in England was 11·7 oz. in 1821, 16·3 oz. in 1851, 22·3 oz. in 1881, and close upon 26 oz. in 1891, the quantity consumed in the latter year being 60,929,915 lb. for a population of about 38 millions. The present average for the whole of Europe is calculated at 2¼ lb. for each inhabitant, which is of course 3 oz. per month. Taking the number of smokers as 30 per cent. of the whole population—a fair proportion, allowing for women, children, and non-smokers—it will be seen that throughout Europe each smoker on the average is responsible for 10 oz. of tobacco per month, or about 2½ oz. per week. In England the quantity is below this—1⅞ oz. per week. A careful German estimate thus states the annual consumption in the various European countries: Holland, a trifle over 7 lb. for each inhabitant; Austria, 3·8 lb.; Denmark, 3·7 lb.; Switzerland, 3·3 lb.; Belgium, 3·2 lb.; Germany, 3 lb.; Norway, 2·3 lb.; France, 2·1 lb.; Sweden, nearly 2 lb.; Spain, 1·7 lb.; Great Britain and Ireland, 1·34 lb.; Italy, 1·25 lb.; and Russia, 1·2 lb. In the United States the amount is 4⅓ lb. Therefore it follows that each smoker in Holland must consume close upon 8 oz. per week, and in the United States about 5 oz. In Turkey the pipe is omnipresent; in many Asiatic countries all classes and both sexes smoke. Until recently a large quantity of tobacco used to be disposed of as snuff, but the habit of snuffing has decreased very rapidly, and 'plugging' or stuffing the nostrils with quids of tobacco has died out altogether. Chewing is now practised by Englishmen chiefly as a consequence of restrictions placed upon smoking, as, for instance, by sailors at sea and by workmen during working hours; it is comparatively common in the United States. In the early days of smoking, when the price of tobacco was high, it was usual to expel the smoke through the nostrils, as is still the custom of some cigarette smokers.

Cultivation.—Although the tobacco-plant is essentially a tropical one, it readily acclimatises itself to temperate regions, and the hardier kinds can be easily cultivated in comparatively cold climates; but the produce is less valuable the farther north we go, and in some countries, as in Germany, tobacco deteriorates if continually grown from its own seed. Unquestionably the best varieties are those of the tropical countries. One of the most remarkable characteristics of the plant is its rapacious appetite for mineral constituents or what ultimately becomes the ash; and it very soon drains the soil of all its nourishing food. The plant is not over particular as to the quality of the mineral constituents, which, nevertheless, materially affect the quality of the leaf. For instance, if salt is employed as a fertiliser the plant will take up enormous quantities of its chlorine—an element with which it can do without almost entirely—and will be ruined by this as regards its burning properties. Then again, a lime soil will produce a large crop, but the general quality will be somewhat impaired by it. The size of the leaf or the fullness of the crop is no guarantee that that crop will produce a good tobacco. The best kind of soil is an alluvial or a light sandy one containing plenty of potash. In America it is found that on new land the plant has larger stems and fibres than on old, the leaves have a coarse texture, and the tobacco a strong acrid taste, although at the same time the yield is larger. Generally speaking, old soil is preferred, not only because it produces a sweeter tobacco, but because it is more easily prepared. The soil should be watched and deficiencies made good. Potash should be present in larger quantity than is necessary for ordinary agriculture, and when deficient should be added in the form of sulphate. In growing the small garden plant the ash of smoked tobacco may be advantageously used by throwing it on the adjacent mould.

The details of the cultivation vary of necessity according to the climate and the country in which it is carried on, but the following is a general description of what usually takes place. The seed-bed, which should be a light friable soil, is well broken up to a depth of 1½ foot some months before sowing. A drain is dug round it after the style of an asparagus-bed, and a brush heap is burned over the ground to kill weeds and supply potash. The seed, which is very small (one ounce containing about 100,000), is mixed with wood-ashes or sand to assist in its even distribution, and is sown in America between the middle of March and the early part of April. About half an ounce of seed is usually required to produce plants necessary for an acre. In cold climates the seeds are sown in hotbeds. When the seed has been sown the bed is covered first with a thin layer of manure, then with a sprinkling of ashes to keep off ants, and finally with cut straw and small branches of trees to protect the seedlings from cold. In India protection from sun and rain is necessary. The soil is kept moist but not wet, and the plants, which appear in about a week, require frequent but gentle watering. They are thinned out after two or three weeks, and in about seven or eight they are transplanted into the fields. The field is prepared by several ploughings, and by being ridged or raised into hillocks about 2 or 3 feet apart. These ridges or hillocks are flattened at the top and the seedlings planted in small hollows on them, one seedling to each hillock, or, in the case of the ridges, about 3 feet apart. If the weather is dry the plants should be watered night and morning. They rapidly shoot up, and are then watched carefully for insects—in some parts a flock of turkeys being kept for this purpose. When the flower begins to shoot it is nipped off, so that it shall not take away from the leaves any of the nutriment of the plant. This 'topping' is not done in Turkey and some eastern

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countries where small leaves are required, and where leaves, buds, and flowers are all used. Generally the leaves are classified into three sorts—the strongest nearest the roots, the medium in the middle of the plant, and the mild at the top. The number and the quality of the leaves may be regulated by nipping off the stem at any desired stage of its growth. Thus a plant may be made to yield eight or ten leaves of a strong flavour, a few more than this of a medium strength, or a still larger number of a mild kind. After the plant has been nipped 'suckers' begin to appear, and must be removed as quickly and as completely as possible. This, together with the removal of worms, can only be adequately performed by a daily examination. Nothing else is now required to be done until the leaves are sufficiently ripe for the harvest, which generally takes place in August or the early part of September. In some places a uniform quality of leaves is aimed at by first cutting a few of them nearest the roots, then leaving the plant eight or ten days for the other leaves to strengthen, cutting a few more of the lower ones, and so on, until the stem is stripped. Another plan is to bring down the whole plant at once by cutting the stem close to the ground.

In India, Ceylon, and some other eastern countries the leaves are simply sun-dried and sent into the market, while in Europe artificial drying is resorted to in the shape of drying-houses heated generally to a temperature of about 70° to 90° F. In America both natural and artificial methods are adopted, nearly always conjointly. Sometimes the leaves are hung in sheds till the spring and then bulked, but more often they are dried in the drying-house, after perhaps being partly sun-dried, then placed in heaps, covered over, and left for a week or two to ferment, with occasional turning to prevent excessive fermentation and firing. The leaves are then sorted, tied into bundles of about a dozen, called 'hands,' and packed under pressure in barrels or hogsheads.

Manufacture.—Tobacco may be selected on account of its colour, its aroma, its body, or its drinking power—i.e. its power of absorbing and retaining water without becoming too wet, a very useful kind of tobacco to some manufacturers in past years. Again, it may be chosen as a fiery tobacco which is used to mix with other kinds difficult of burning, while a material like Chinese tobacco, which is of a very light yellow colour, without body and almost flavourless, is bought solely for producing variety of colour in mixtures. Leaves for cigar-making must be of a good colour and fair body, possess a pleasant aroma to begin with, emit an agreeable odour on burning, have a fairly fine texture, a certain amount of toughness, the ribs and veins must be small, and finally, they must answer the burning test, which is that the leaves should continue to smoulder after they have once been lighted.

Tobacco is imported always tightly compressed and apparently quite dry and crisp. Sometimes it is in the full leaf in bundles tied round by one of its own leaves; sometimes the midribs have been removed—when the material is then known as 'strips.' American varieties are exported in these conditions roughly and tightly packed in hogsheads. The more tender kinds, such as Turkish, Chinese, and Ceylon, are carefully packed leaf upon leaf. The names of some of the better known varieties in the market are those of Virginia, Kentucky, Maryland, Big Frederick, Western (leaf and strips), Indiana, &c. from America; Java, Japan, China, India, and Ceylon from the East; and Turkish and German from Europe. The dry-looking imported article contains from 10 to 20 per cent. of water, or on an average about 14 per cent.; but before manufacture it must be impregnated with more water and steamed, when the leaves rapidly becomes flaccid and easily open out.

In the manufacture of cigars the leaves, after being thus treated, are stripped of their midribs, smoothed and sorted, the perfect half-leaves being put on one side to be used as wrappers. One of these strips is cut into the shape of a balloon gore, and fragments of imperfect leaves and cuttings, known as the 'fillers,' being placed at one end, the strip is wrapped round them. Over this is then wound spirally a long narrow rectangular slip called the 'wrapper,' commencing at the lighting end and finishing at the pointed or mouth end. The cigars are then gauged and cut to length, dried and packed. Cheroots differ from cigars only in the matter of shape, being open at both ends, generally with one of them much broader than the other. Good cigars should consist of the same tobacco throughout, but very often the seductive wrapper conceals an inferior and even bad material. Cigars are rarely adulterated; the interior is at worst nearly always tobacco of a cheap kind. The best Havana cigars all come from Cuba; but it is a common practice to place home-made cigars in imitation foreign boxes. Cheroots come chiefly from the Philippine Islands. Mexican tobacco has met with much favour of recent years for cigar-making. The high import duty for cigars has fostered the practice of importing the leaves, on which less duty is paid, and manufacturing them in England. The difference between the foreign and British made articles is easily detected, and, as a rule, the latter are more glossy, better made, and more uniform in their appearance than the former. In the United States cigar-making is an important industry, and the best brands of 'domestics' bring a good price. Cigar-smoking in northern Europe is of recent origin. The first cigar-shop in Germany was opened in Hamburg in 1788. French soldiers brought the habit of smoking from Spain early in the 19th century.

The greater portion of the imported leaves, however, is manufactured into pipe tobacco, of which there are two classes—the *cut* and the *cake* or *twist*. As a rule, for the former class the leaves are stripped of the midrib, damped, allowed to ferment a little, and are then placed in a square iron box and pressed into a large cake. The dark-coloured liquor which is squeezed out is used as 'sauce' for a stronger product. The cake is then cut in a cutting machine into shreds of the desired fineness. The cuttings are gently steamed, pulled, well mixed, and scented if desired. *Shag* is prepared in this way from a rather strong variety of leaf. In the case of *Bird's-eye* the midribs are not removed. *Returns* is so called from being prepared from broken and rejected pieces and siftings.

In the second class there are also many kinds, such as *Cavendish*, *Negrohead*, *Pigtail*, *Bogie*, &c. The strongest kinds of leaf are employed in their preparation, and generally plenty of sauce is mixed in. For *Cavendish* the leaves are stripped, sauced, fermented, and are then laid one upon another and pressed into cakes of the desired size. They are sometimes made into sticks about 9 inches long and 1 inch thick, which are then laid across each other equally and pressed together: this kind is called *Negrohead*. In the case of twist tobacco the stripped fermented leaves are twisted either by hand or by a spinning-wheel after the style of making string. The rope so obtained, if thin, is known as *Pigtail*, and if thick, generally as *Bogie*. It is wound into balls or reels. All these kinds are oiled with sweet-oil, which prevents them from sticking together and from becoming too dry. In America mild cakes are impregnated with molasses

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or liquorice to give them a sweet flavour in chewing, but in England the sale of such tobacco is illegal. Cigarettes are usually made of the Syrian species, such as fine-cut Turkish, Salonica, &c.; but American tobacco has of late years been rather extensively used.

When the British duty on tobacco was reduced in 1887 there was a limit placed on the amount of water to be allowed in the manufactured article. The maximum amount permitted is 35 per cent., whereas in cake and twist 45 to 50 per cent. used to be of frequent occurrence. The adulterants of tobacco are legion. All kinds of vegetable substances, gums, saccharin, and mineral matters have at different times been detected. Manufacturers in Britain are prohibited, under a penalty of £200, not only from using but from having in their possession sugar, honey, molasses, treacle, leaves, herbs, or plants, powdered wood, weeds, ground or unground, roasted grain, chicory, lime, sand, umber, ochre, or anything capable of being used to increase the weight of tobacco and snuff. Any water over and above 35 per cent., of course, is now an adulterant; the excise penalty in this case being £50 and the forfeiture of the tobacco.

Snuff used to be made from tobacco leaves, but now it is prepared almost entirely from the stalks and ribs which are not used by the tobacco-manufacturer. The dry snuffs include the well-known Welsh, Scotch, and Irish varieties, and are prepared by finely grinding the stalks in a mortar after they have been allowed to ferment. The characteristic odour of the Irish and Welsh kinds is obtained by gently roasting the stalks previous to grinding. The moist snuffs include most of the preparations with fanciful names. These are generally made by grinding the stalks wet, allowing the fermentation to take place after grinding, mixing with various salts sanctioned by the excise, scenting and moistening to the desired degree. Snuff has been, and is sometimes now, adulterated to an enormous extent. It is no uncommon thing at the present day for the tobacco-manufacturer to add the sweepings of his whole factory to the parcel of scrap pieces intended for the snuff-maker. Besides this, many adulterants are purposely added, including many kinds of vegetable matter, salts, red-lead, chromate of lead, and oxide of iron.

Constituents.—The green leaf, and even the bulk of the dry imported leaf, contains a large ratio of complex organic bodies which retard combustion, and which, on forcing the burning, give off very objectionable odours. It is the processes of curing, fermenting, and manufacturing which get rid of or modify these objectionable bodies, and so render the material fit for use. Excessive fermentation has to be avoided, especially with cigar tobacco, because it blackens the leaves and produces ammonia compounds. Some leaves, especially those grown in tropical climates, do not require fermentation. The mineral constituents remain the same throughout, except in their combination with the organic substances, and on burning they constitute the incombustible residue or ash. The ash should be white or grayish white in colour, and not excessive in quantity—generally between 12 and 20 per cent. of the dry leaf; redness denotes iron in the soil, and blackness is due to carbon, the result of imperfect combustion. The characteristic constituent, however, of all tobacco is the alkaloid *nicotine*, which varies in quantity from about 1 to 9 per cent. The best flavoured kinds, such as Havana and Manilla, contain only about 2 to 3 per cent., while some of the commoner varieties of French and German run up to 9 per cent. American Virginia and Kentucky average about 4 or 5 per cent. It is believed by many that the spotted appearance is a good indication. The origin of these spots has given rise to many opinions; but it is now understood that the pale spots are formed by the sun's heat being concentrated by transparent globules on to the leaf and locally burning.

Commerce.—The revenue of Great Britain from the import duty on tobacco is close upon 10 millions sterling, and in 1891 constituted for the first time more than half the whole revenue of the customs department. This is, of course, because it is taxed so enormously out of proportion to its own value, and so much more heavily than the other articles. The duty, which was raised in 1878 from 3s. 2d. to 3s. 6d., was lowered again, with a restriction as to the ultimate moisture, in 1887, and the present rates are as follows: Unmanufactured, containing 10 per cent. or more moisture, 3s. 2d. per lb.; unmanufactured, containing less than 10 per cent. moisture, 3s. 6d. per lb.; cigars, 5s. per lb.; cavendish, 4s. 6d. per lb.; other manufactured tobacco, 4s. per lb. As the price of unmanufactured tobacco in bond varies roughly between 4d. and 1s. per lb., it will be seen that the amount paid as duty is nearly ten times the actual value of the material in the case of the poorer qualities, and more than three times in that of the better kinds. This disproportionate tax naturally offers a strong temptation for surreptitious trading or Smuggling (q.v.). The authorities keep up a rigorous supervision to prevent it, and are assisted in their work by the stringency of the law, which stipulates that no packet be allowed to be imported of less weight than 80 lb. (except samples), and this must not arrive in any vessel of less than 120 tons burden. Furthermore, the imports are not allowed to enter the United Kingdom except through specified ports duly approved by the commissioners. Passengers entering the United Kingdom from abroad may carry 8 oz. of cigars or manufactured tobacco free of duty, but persons from the Channel Islands are allowed only 4 oz. Duty can be paid on amounts not exceeding 3 lb. by passengers from the Continent (unless they are frequent visitors), and on any quantity up to 7 lb. if from the West Indies and other more distant parts. Of unmanufactured tobacco the traveller may pay duty on any quantity not exceeding 9 lb. If these conditions are evaded the goods are always confiscated, and usually double or treble duty is charged.

The actual revenue receipts for tobacco for 1891 were £9,952,000, an increase of £418,000 over 1890, the total revenue from the customs for 1891 being £19,736,000. The imports in 1889 were 79,128,889 lb. of unmanufactured tobacco and 4,227,545 lb. of manufactured and snuff, together worth £3,973,925; in 1891, respectively, 59,996,176 lb. and 63,493,554 lb., worth £3,423,971. The exports in 1891 were 6,764,910 lb. of unmanufactured and 1,712,296 lb. of manufactured, worth £481,647.

More than two-thirds of the unmanufactured tobacco comes from the United States, a considerable amount from Germany, and smaller quantities from Japan, India, China, and other countries. Cigars are chiefly brought from the West Indies, Philippine Islands, Germany, and of recent years Mexico. The country which derives the greatest revenue from tobacco is France, where the home-grown crops are purchased by the government. Then follow in the order named the United Kingdom, Austria-Hungary, Spain, and Italy.

Physiological Effects.—Tobacco acts in various ways on the system, depending, first, on the individual, and secondly, on the time and circumstances of its being consumed. It acts most frequently as a sedative or a narcotic. In some instances it will rouse the sluggish mind into

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activity, while in others it will moderate excessive mental excitement. It will often correct the disagreeable effects of nervousness; while, on the other hand, it will likewise act as a laxative. The most noticeable characteristics perhaps are the effects of smoking on the nervous system in such cases as those in which it is upset by mental distress or anxiety. At the same time it must not be forgotten that there are persons whose nerves are disarranged and quite upset by smoking. By such people the habit should be tabooed altogether. Others again are only inconvenienced after an excess, while there are those who can stand any amount. Consequently, if the use of tobacco is ever to be governed by a single law, it will be by that of common sense. The amount to be consumed must be regulated by the individual who consumes it. Although even excess has never been known to originate a specific disease, still it reduces the system to a low condition, and unfits it to fight against ailments brought on by other causes. Until the system is near maturity, tobacco should be only lightly indulged in, or avoided *in toto*, as it acts prejudicially, even in small doses, in early life, and if used in excess is liable to have a permanent ill effect. The immediate effects of tobacco poisoning are very transitory, and they soon work off.

The usual effects of an overdose of tobacco are faintness, nausea, giddiness, general relaxation of the muscular system, loss of power of the limbs, cold perspiration, and vomiting. In some cases there is purging, and in others a sense of sinking or depression in the region of the heart. Attendant on these symptoms are a dilation of the pupils, dimness of sight, weak pulse, and difficulty of breathing. In mild cases a little stimulant and fresh air are the best remedies. Some of these disturbances of the functions are occasionally felt by the inveterate smoker, who also is liable to suffer from what is known as 'smoker's sore throat.' This makes itself evident by an irritable state of the mucous membrane at the back of the throat, with dryness, producing a tendency to cough and an enlarged, soft, sore condition of the tonsils, which renders it painful to swallow. It may exist without detection for a long time; but if a damp, cold, foggy state of the air arises, the throat becomes troublesome and painful, enlargement of the tonsils is detected, and the symptoms become much aggravated by any attempt to smoke. When smoking is altogether suspended it soon disappears, but it is incurable while the habit is persisted in, although the more troublesome symptoms may be temporarily alleviated.

The combustion of tobacco in smoking is never a complete one. While there are large quantities of carbonic acid and water—the ultimate products of complete organic combustion—produced, there are also many organic substances which are formed or become released by the heat, and which distil over with the gaseous bodies. It is the condensation of these volatile substances in very minute particles, in a similar manner to the condensation of steam at the kettle spout, which gives rise to the appearance of smoke. The colour of the smoke is dependent on the quantity of these substances present, and the rapidity with which they are condensed. The burning of tobacco should be free, with a clean ash, but not too rapid. If it is retarded from any cause, such as the improper fermentation of the leaf, or by containing the wrong mineral constituents, then objectionable products are obtained which possess both a disagreeable taste and odour. Moreover, carbonic oxide—a distinctly poisonous gas—is produced in considerable amount. All these substances tend to create the unpleasantness so often experienced with a badly burning cigar. A large proportion of the nicotine is consumed or destroyed in the burning, the ratio depending on the freeness or completeness of the combustion. The bulk of it, therefore, is not absorbed into the system, as some would make out. Indeed, it is impossible for it to be so, as one ordinary cigar contains enough nicotine to poison two men. A tenth of a grain will kill a medium-sized dog, so that a quarter of an ounce of mild tobacco would contain sufficient to poison twenty or thirty of these animals. The other principal products of the burning are ammonia and its compounds, an empyreumatic oil, and a dark, bitter, resinous substance. The first named is very objectionable both to taste and smell if in undue proportion. The last two are very evident, the former in the odour of stale tobacco, and the other in the bitter taste of the oil in the stem of a foul pipe, and both largely impregnate the smoke. These organic substances begin to be deposited directly they are formed, so that some remains in the mouth, and if the smoke is swallowed or passed through the nostrils much more will be retained and absorbed into the system—certainly an undesirable result.

It will be quite evident that the least harmful method of smoking is the use of a long pipe made of an absorbing material, such as clay or meerschaum. After this a short pipe, then the cigar and cigarette. In the progress of smoking a cigar the oils, &c. partly become condensed in it, and at the same time driven farther along until the end becomes nearly saturated with them. This end piece is often consumed with great eagerness and relish, but it is the most harmful part, and is liable to produce dyspepsia, especially with an empty stomach. The specifically deleterious effects sometimes due to cigarette-smoking may depend on poisonous substances used in preparing the cigarette-papers. The best time for smoking is unquestionably after a meal, and it should not be indulged in immediately before one. The habit of snuff-taking is perhaps the least harmful of the varied uses of tobacco, as the amount consumed must be within reasonable limit. Chewing, on the other hand, is doubtless the most deleterious. Owing to the rapid growth of cigarette-smoking, laws had been passed, up to 1891, in about three-fourths of the United States prohibiting smoking by youths.

Although on its introduction into Europe the cultivation of the plant was advocated on account of its medicinal virtues, it is now very little used for them. It has been found effective in spasmodic cases, but at the present time there is only one preparation in the British Pharmacopœia—an infusion of the leaf in water—and this is rarely used. Nicotine is an antidote in poisoning by strychnine, and *vice versâ* strychnine will act as an antidote to nicotine. An infusion of tobacco is an excellent insect destroyer, and the spraying of the leaves of a plant with water containing it is very effectual. The juice or 'sauce' squeezed out of the leaves in their preparation for tobacco is occasionally sold and used as a sheep-wash.

English-grown Tobacco.—In consequence of the depressed state of agriculture in England, the idea of the home-cultivation of tobacco was started, and in 1886 the necessary permission from the Inland Revenue authorities was obtained, and a fair number of trials were made. The results were so encouraging that permission with less severe restrictions was obtained again for 1887, in which year, with an early start, a thoroughly fair trial was made. Every grower reported favourably on the results of his experiments, and the ability to grow the plant in Britain was fully established. But when the authorities were approached with a view to enable the cultivation to be commenced

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in earnest, and as a source of profit to the grower, there was not the slightest hope held out that any facilities would be granted; any scheme likely to interfere with the machinery responsible for the annual collection of £9,000,000 could hardly be viewed with favour by the officials concerned.

Had this been foreseen it would hardly have been necessary to try experiments to show that tobacco could be cultivated in England, since history fully demonstrates the fact. From the time of its introduction down to nearly the end of the 18th century, when it was finally banished, the successful cultivation had always more or less been carried on. James I. and Charles I., of course, prohibited it, but without effect. Charles II., when he commenced to derive revenue from the imported leaves, imposed so heavy a tax on the home-grown article as it was hoped would stop its cultivation. The surreptitious growth was continued, in spite of all laws to the contrary, right down to the reign of George III., when it was finally stopped by an act passed in 1782. The plantations in Yorkshire were then destroyed, and the planters imprisoned and heavily fined—the large sum for those days of £30,000 being exacted as penalties. In Ireland the treatment was less severe, and the culture was not finally stopped until about the year 1831, when it was found to be making too much progress. In those days the profit would be more certain and the competition from foreign markets not so great as now, but against these might be weighed the greater technical knowledge of the modern farmer; and the collecting of duty should be easier now than it was then. The recent experiments may be held to have proved that in many parts of England tobacco might be expected to produce a crop worth £50 an acre, and that there is time in the English summers to ripen a fair quality of leaf. What was grown never had a fair trial in regard to curing. English soil is not all equally suited for tobacco-culture; and the statement that tobacco poisons the land merely means that it drains it of certain constituents which can be supplied again by proper treatment with manures, &c.

The total quantity of tobacco grown in the United States in 1880 was 472,661,159 lb. (of which 171,120,784 lb. were grown in Kentucky); and in 1881-90 the average crop was nearly 490,000,000 lb. The value of a year's crop in 1880–90 varied from $30,000,000 to $45,000,000. The Inland Revenue receipts alone reach some $34,000,000. The exports of unmanufactured tobacco from the United States in 1890 amounted, with stems and trimmings, to 255,647,026 lb., valued at $21,479,556; and of manufactured tobacco, including cigars and cigarettes, the value in the same year was $3,876,045. The imports of tobacco in 1890 were 28,728,159 lb., worth $17,605,663, besides 1,250,218 lb. of cigars, &c., worth $4,104,791. Prior to 1890 the import duties ranged from 40 cents to $2·50 + 25 per cent. *ad valorem*, but under the McKinley tariff they range from 35 cents to $4·50 + 25 per cent. *ad valorem* per lb.

See works on tobacco and tobacco-growing by Billings and by Lock (1886); on its history and associations by Fairholt (1859; new ed. 1876) and Taylor (1886); Reports and other papers published by the American government; German works on tobacco-growing and manufacturing by Tiedemann (1854), Wagner (5th ed. 1888), and Becker (2d ed. 1883); Bragge's *Bibliotheca Nicotiana* (1880); on English and European tobacco-culture, see a work by Beale (1887), and papers in the *Journal* of the Royal Agricultural Society, vols. xxii. and xxiii.; and on the hygienic question, see Hare, *The Physiological and Pathological Effects of Tobacco* (Phila. and Lond. 1886), and Jolly, *Etudes Médicales sur le Tabac* (1865).

TOBACCO-PIPES. The oldest tobacco-pipes known are those which have been found in the ancient grave-mounds of the Mississippi Valley. These are in various kinds of stone, some being carved

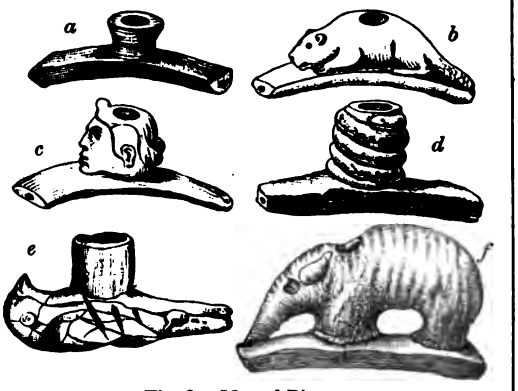

Fig. 3.—Mound Pipes:

a, 'monitor' pipe; *b*, beaver pipe; *c*, pipe carved in the form of a human head; *d*, serpent pipe; *e*, bird pipe; *f*, elephant pipe. (From *American Naturalist*, April 1882.)

into the form of human heads and others into the shape of various animals, but the most common kind have a plain, more or less conical bowl. All have a short, broad, slightly-curved, perforated stem, forming a sort of base for the bowl. Among the animals represented are the beaver, the bear, the seal, the frog, and various kinds of birds. But the most interesting of all are what are called 'elephant-pipes' (fig. 3, *f*), of which only two appear to have been found. These unmistakably represent an animal like the elephant, only the tusks are wanting. As the remains of the Mastodon (q.v.), which, however, had tusks, are found in America, the curious question arises, has this animal become extinct on that continent since the time of the people who carved these pipes? This matter has given rise to an animated controversy among archæologists in the United States, some of whom, apparently without much reason, maintain that the two pipes found are of doubtful authenticity.

Of modern or comparatively modern American pipes, the most interesting are the Calumet (q.v.)

Fig. 4.—Indian Calumet.

or pipe of peace, the tomahawk-pipe (see TOMAHAWK) or war-pipe, and the elaborately and grotesquely carved stone-pipes made by the Indians of the North Pacific coast, which at first glance do not look like tobacco-pipes at all. The pipes of wood and whale's bone made by the Stickeen Indians, in the form of boats bearing houses, are also very curious.

Except what were made in earlier times in America there are, of course, no tobacco-pipes of a date prior to the end of the 16th century. The first common clay-pipes manufactured in Europe were perhaps those of England and Holland. Some of them, of small size, are known as Elfin Celtic, or fairy pipes. Pipes of baked clay show great diversity of shape and ornament. The finest kinds of these were made during the later half of the 18th century at Sèvres, Chelsea, Dresden, Vienna, and other famous European porcelain

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works, many clever artists having been employed in decorating them. Porcelain pipes, but mostly of a plain kind, are still largely made in Germany. Modern French clay-pipes often display skilful modelling. Meerschaum-pipes, many of which are exquisitely carved, are made in large numbers in Austria, and artificial meerschaums in much greater quantities. 'Briar-root' pipes are cut out of the wood of the tree heath (*Erica arborea;* Fr. *bruyère*), which grows in southern France and Italy, and are manufactured at Nuremberg and at St Claude in the east of France.

A great variety of other materials are or have been used for tobacco-pipes. Among these may be mentioned silver, brass, and other metals, glass, ivory, horn, cane, bamboo, and various kinds of stone. Equally numerous have been the ways of decorating their stems and bowls, such as by enamelling, chasing, engraving, carving, and inlaying. The same thing may be said of pipe-cases and tobacco-boxes. In some parts of the world tobacco-pouches are beautifully embroidered. The Hookah (q.v.) or narghileh bowls of India and Persia are often most elaborately ornamented. Pipes made by the Kookies (Manipur) have reservoirs for collecting the tobacco-juice, which is afterwards put into the mouth. The pipes used by the Kirghiz, or at least some of them, have three bowls. Some singular forms of tobacco-pipes are found in uncivilised countries. In New Guinea they consist of capacious hollow cylinders of bamboo, the large volume of smoke which these contain being drawn into the mouth by an aperture at the end. In the Zambesi district of East Africa the stems are formed of an antelope's entire horn, from the middle of which a vertical piece of wood rises, carrying the bowl. The western Eskimo uses pipes with remarkably small metal bowls, and such pipes, though different in form, occur also in China and Japan. The largest collection (7000) of tobacco-pipes ever formed was that made by William Bragge of Birmingham (1823–84), of which he printed a catalogue, *Bibliotheca Nicotiana* (1880). This collection, now dispersed, included almost every known kind of pipe, as well as varieties of tobacco and snuff boxes.

Tobago, the most southerly of the Windward Islands belonging to Britain, lies 75 miles SE. of Grenada and 18½ miles NE. of Trinidad, is 32 miles long, from 6 to 7½ broad, and has an area of 114 sq. m. The island was discovered by Columbus in 1498, and named by him Assumption; the name of Tobago is supposed to have arisen from the free use of tobacco by the Caribs when first visited by Europeans. It has been frequently contested between Dutch, Spaniards, and French, but came into British possession in 1763. The island is volcanic, its surface being irregular and picturesque, and abounding in conical hills and spurs, all connected by a ridge running through the interior, the greatest elevation of which is 1800 feet above the level of the sea. From the high ridge descend deep and narrow ravines, which terminate in small alluvial plains. Scarborough is its chief town, pleasantly situated on the south side, and at the base of a conical hill rising 425 feet in altitude, crowned by Fort King George, now without garrison. The chief exports are rum, molasses, cocoa-nuts, and live-stock to the amount of from £20,000 to £40,000. The imports run from £20,000 to £30,000. Pop. (1880) 19,324; (1890) 20,727. The island was united with the colony of Trinidad in 1889, and has a commissioner appointed by the governor.

Tobermory. See MULL.

Tobit, THE BOOK OF, one of the most curious and interesting of the Old Testament apocrypha, tells of Tobit, and Tobias his son. Tobit was a pious, upright, and God-fearing Israelite of the tribe of Naphtali, who had been carried captive to Nineveh by 'Enemassar' (Shalmaneser). Among his many good works was the practice of defying the prohibition of the Assyrian kings by secretly burying the bodies of his slain fellow-countrymen. He was at last discovered, and deprived of all his goods in consequence. To add to his misfortune, through an accident that befell him as he slept in the open air one night, he became blind. In his poverty and distress he resolves to send his son Tobias to Rhagæ (Rai) in Media to recover an old debt from a friend. Tobias finds a companion for the long journey in an unknown youth (really the archangel Raphael) who on the journey gives him much valuable information and advice. Acting on this, he catches a great 'fish' in the Tigris, and secures its heart, liver, and gall. By means of the first two he is able to deliver from the power of the evil spirit Asmodeus his lovely cousin Sara, daughter of Raguel, at Ecbatana, whom he marries and, after recovering the debt for which he had been sent, leads back to his father's house. Arrived at home, he is able with the gall of the fish to cure his father's blindness. The book closes with Tobit's psalm of thanksgiving, and relates how he enjoyed a hundred years' happiness after these events, Tobias also living to see the age of 127. The Book of Tobit exists in Greek, Latin, Syriac, Aramaic, and Hebrew. There is little doubt that the Greek is the original. Of this there are two recensions, a shorter and a longer, the shorter being the one generally current, and probably the earlier. The longer occurs in the Codex Sinaiticus, and has been published by Reusch (1870). It is represented by the Latin, Aramaic, Hebrew, and partly also by the Syriac version. The Hebrew version was published by Münster as early as 1542; the Aramaic was first edited by Neubauer in 1878. If the Greek is the original, the book can hardly have been written before the 2d century B.C., and it can perhaps be most appropriately assigned to the period of the Jewish struggles for independence, when, for example, it was the complaint of the faithful that their oppressor had cast out many unburied (2 Macc. v. 10). Again, if originally written in Greek, it probably had its origin in Egypt. In fact it has never been widely known in the Syrian Church; its author's acquaintance with the eastern localities he names is superficial and not always accurate; and it has been pointed out that the 'fish' caught in the Tigris is most probably in reality the Egyptian crocodile, of which we know from ancient medical writers that the smoke of its liver used to be regarded as a cure for epilepsy, and its gall for leucoma. But those who trace the story to a Persian origin are also so far justified by certain facts. Asmodeus is manifestly the Persian evil spirit Aeshmâ Daevâ, and Raphael has the attributes of the protecting spirit Çraosha. The presence of the dog, too, who goes out and returns with Tobias and Raphael denotes rather a Persian than a pure Hebrew source, the Jews regarding that animal as unclean, while with the Iranians it is sacred, and the companion of Çraosha.

The nature of the additions to Tobit in the larger versions can be seen by the English reader in Churton's *Uncanonical and Apocryphal Scriptures.* The book has been commented on by Fritzsche (1853), Reusch (1857), Sengelmann (1857), and Gutberlet (1877). See Schürer, *Gesch. d. Jüd. Volkes,* vol. ii. (Eng. trans.); and A. Neubauer, *The Book of Tobit: a Chaldee Text* (1877).

Tobogganing. See SLEIGHS.

Tobolsk, a town of western Siberia, capital of a government, stands at the confluence of the Irtish and the Tobol, nearly 2000 miles east of St

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Petersburg. It is well built, with timber houses and wide and regular streets, and its position on the two great rivers is picturesque; but its situation, considerably north of the great commercial highway between Russia and Siberia, and at a distance from the more productive regions of the country, is unfavourable for the development of commerce. Pop. 20,130.—For the *government*, see RUSSIA; also SIBERIA.

Tobo'so, EL, a small town (pop. 1904) in the Spanish district of La Mancha, 60 miles SE. of Toledo, the home of Don Quixote's peerless Dulcinea del Toboso.

Tocantins, an important river of Brazil, rises in the state of Goyaz, flows north through the state of Pará, and finally, after a course of 1500 miles, widens into the Pará (q.v.), 138 miles from the Atlantic. Its principal affluent is the Araguay (1600 miles), which joins it at the northern extremity of Goyaz, and bears along a greater volume of water than the stream to which it is tributary. The Tocantins is traversed by steamers to 400 miles from the sea; and above the line of falls and rapids 400 miles more is navigable.

Toccata. See MUSIC, Vol. VII. p. 358.

Tocqueville, ALEXIS CHARLES HENRI CHÉREL DE, was born at Verneuil, in the department of Seine-et-Oise, 29th July 1805. His father, the head of the ancient family of Tocqueville in Normandy, whose wife was a granddaughter of Malesherbes, narrowly escaped the guillotine, but did not emigrate, and, having preserved his property, reassumed in 1815 the title of Count. Young Tocqueville was called to the bar at Paris in 1825, and after a short tour in Italy became an assistant magistrate at Versailles. In 1831 he accepted a government mission to America, to report on the working of the penitentiary system, but the chief fruit of which was his great work, *De la Démocratie en Amérique* (1835; 15th ed. 1868; Eng. trans. 1835). *Democracy*, which was the first carefully thought out book written in Europe on the subject, made at once a great sensation. The accuracy of the statements, the skill with which the matter had been digested, and the beauty of the style were loudly praised by critics. The author was described as the continuator of Montesquieu, and the greatest political writer of his time. He became successively a member of the Academy of Moral Sciences and of the French Academy. The work is a fair and lucid statement from a moderate point of view; but his knowledge was hardly sufficient to bear the whole deductive structure of system which be built on it. In 1835 De Tocqueville visited England, where his work had made him known, and where he received an enthusiastic welcome from the leaders of the Whig party. In the same year he married Miss Mottley, an Englishwoman. He shortly afterwards, by a family arrangement, entered into possession of Tocqueville. He stood in 1837 as candidate for the Chamber of Deputies, and was defeated; but two years later was returned by his neighbours, the Norman farmers, by an overwhelming majority. As a speaker De Tocqueville did not succeed, but he exercised great influence on the legislature. Immediately after the revolution of 1848 he was the most formidable opponent of the Socialists and extreme Republicans, and as strenuously opposed Louis Napoleon. He became, however, in 1849 vice-president of the Assembly, and from June to October in the same year was minister of Foreign Affairs. At this time he vindicated the policy of the expedition to Rome, on the ground that it would secure liberal institutions to the States of the Church. After the *coup d'état* he returned to Tocqueville, where he devoted himself to agricultural pursuits. He there wrote *L'ancien Régime et la Révolution* (1856; Eng. trans. same year), a work now regarded as defective, not merely in width and depth of knowledge, but in being too favourable to the Revolution. He had also written a work on the reign of Louis XV. (1846–50). In June 1858 he broke a blood-vessel, and took up his abode at Cannes, where he died, 16th April 1859. Tocqueville's *Œuvres et Correspondance Inédites* were published in 2 vols. (1860), by his friend M. de Beaumont, with a biographical notice (trans. as *Memoirs, Letters, and Remains*, 1861). A collected edition of his works appeared at Paris in 9 vols. in 1860–65. See the work on De Tocqueville by Jaques (Vienna, 1876); and his *Conversations and Correspondence with Nassau Senior* (2 vols. 1872).

Todas. See NEILGHERRY.

Toddy, the name given in the East Indies to the fermented juice of various palms from which Arrack (q.v.) is distilled. It is applied in Britain to a mixture of whisky, sugar, and hot water, which forms a popular drink in Scotland.

Todhunter, ISAAC, mathematician, was born at Rye in 1820, studied at University College, London, served some time as a tutor, and so was enabled to enter St John's College, Cambridge, where in 1848 he graduated senior wrangler and Smith's prizeman. Elected to a fellowship in his college, he became eventually its principal mathematical lecturer, and ere long his handbooks of Algebra, Geometry, Conic Sections, Trigonometry, Mensuration, and Mechanics made his name known, if not always honoured, in every schoolroom in England. For more advanced students his indefatigable energy and rare faculty of exposition provided also manuals on the Differential and the Integral Calculus, Analytical Statics, Plane Co-ordinate Geometry, and Analytical Geometry. He died 1st March 1884.

Todleben, EDUARD IVANOVITCH, Russian general, was born of German descent at Mitau in Courland, 20th May 1818. After studying at Riga and St Petersburg, he distinguished himself as a lieutenant of engineers in the Caucasus, and was with the engineer corps when the Russian army entered the Danubian Principalities in 1853. His genius as a military engineer was discovered before the Russian army crossed the Pruth, on its retreat from the Principalities; and when the French and English undertook the siege of Sebastopol, Colonel Todleben was sent to assist in its defence. He arrived in the middle of April, and the fortifications were soon placed under his direction. The prodigious activity displayed by the Russians in making good the damage sustained by the heavy fire of the enemy filled the allies with astonishment. Everywhere massive ramparts of earthworks, mounted with formidable batteries, rose up as if by magic at each threatened point within the line of defence. During the latter part of the siege he was wounded in the leg. For services in the siege he was created a general, decorated, and made director of the engineer department in the war office. In 1865 he visited England, and was cordially received. He held no very important post till disasters began to befall the Russian army during the Turkish war. Todleben was remembered, and was called to undertake the siege of Plevna (q.v.), which, after a brilliant defence, he took. He was subsequently made commander-in-chief in Bulgaria, and at the time of his death, 1st July 1884, was governor of Odessa.

He wrote an admirable account of the defence of Sebastopol (French ed. 1864). There are Lives by Brialmont (Brussels, 1884) and Krähmer (Berlin, 1888). See Kinglake's and Hamley's histories of the Crimean War.

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Todmorden, a market-town on the border of Yorkshire and Lancashire, prettily situated among hills on the Calder, 9 miles N. by E. of Rochdale, 18¼ NNE. of Manchester, and 13 W. of Halifax. The classical town-hall was erected in 1875, and in front of it is a bronze statue by Foley of John Fielden, M.P. (1784–1849), the founder here of an enormous cotton-mill. Coal abounds in the vicinity. Pop. (1871) 21,764; (1891) 24,725.

Tofana. See POISON.

Toga (from Lat. *tego*, 'I cover'), the principal outer garment of the Romans, was a thick woollen cloth, originally worn over a loin-cloth or apron. When the tunic was adopted the toga became more bulky and was worn in a looser manner. It was probably of Etruscan origin, and yet it came to be considered the distinctive badge of the Roman citizen, whence the Roman people are called *togati* or *gens togata*. Scholars are divided as to its shape, some making it elliptical with pointed ends, while others declare that the most usual form was a crescent, the back of which was an elliptical curve with a circular segment of cloth sewn on to its concave side. The toga of ordinary life was white in colour. The *toga prætexta* had a broad purple border, and was worn by children and by the curule magistrates and censors. When the young Roman was declared to be legally of age he assumed the ordinary toga, on this account called the *toga virilis*. Persons in mourning (*sordidati*) and persons under impeachment wore the *toga pulla*, a garment of a dark colour; while those who were seeking office were wont to dress themselves out in garments which had been made artificially bright by the help of chalk—hence their name of *candidati*. Under the emperors the toga as an article of common wear fell into disuse; but it continued to be worn by magistrates and people on all official occasions.

Togo, in Togoland, since 1884 a German protectorate on the Slave Coast, east of the British Gold Coast, between 0°30′ E. long. and 1°41′ E., the boundary towards the interior being somewhat indefinite. The area is estimated at 16,000 sq. m., and the pop. at 500,000. Togo, the largest native town (pop. 3000), is on Lake Togo; Little Popo is the capital, and Lome the chief port.

Toise, an old French linear measure, containing 6 French feet; it was equivalent to 1·949 French mètres, or to 6·395 English feet.

Tokat, a town of Sivas province, Asia Minor, 70 miles inland from the Black Sea. Pop. 10,000.

Tokay, a small Hungarian town on the Theiss, 130 miles NE. of Pesth by rail, with a pop. of 4479. It was destroyed by fire in 1890. In the neighbourhood several battles took place during the troubles of 1849; but the place is known solely for its famous wine, grown on the Hegyalja Mountains. Great care is bestowed on the proper assortment of the grapes (which are never gathered till fully ripe), and also on the preparation of the wine—of which some thirty-four sorts are reckoned; but all of these may be grouped into the two classes of sweet and dry. The wine is brownish yellow while new, changing to a greenish hue as it grows older. The average annual produce of the Tokay vineyards is over 2,000,000 gallons. Tokay wine enjoys an immense reputation. The *Ausbruch* is one of the finest kinds, but is surpassed by the *Essence*, regarded by many as the noblest of all wines, made from the juice that exudes from the grapes by the pressure of their own weight. Genuine Tokay is obtainable by wine-merchants only in small quantity (this is especially the case with the more valuable sort, the sweet or imperial Tokay), and is largely mixed with inferior wines to increase the amount. Large quantities of 'imitation' Tokay are made by French and German chemists, and sent to all parts of Europe, not excepting Hungary itself.

Token. For token money, see MONEY, Vol. VII. p. 270. In Scotland it was usual both in the Established Church and in seceding churches for the minister and elders to furnish communicants with tokens or small vouchers of brass or pewter, serving as passes permitting them to take their places at the communion table, whereupon the tokens were returned to the officiating elders. This system of metal tokens has now been generally superseded by cards.

Tōkyō, or TŌKEI ('Eastern Capital'), is the chief city of the Japanese empire. Until 1868, when the emperor removed his court thither from Kyōtō, it was known as Yedo ('Estuary Gate'). Originally the site of a small castle, it was chosen by Tokugawa Iyeyasu in 1590 as the seat of his power, and 80,000 of his warriors settled here. The *daimyos* (territorial lords) were also compelled to spend six months of the year in Yedo. By reason of its position at the mouth of the rivers which drain Musashi, the largest of the plains of Japan, it is well fitted to be a national centre. From it Japan was reduced to unity under the Tokugawa *Shōguns*, and the emperors, in resuming direct power on the fall of the Shōgunate in 1868, sought to carry on the traditions of centralisation by establishing the restoration government in Yedo. The city has gradually been enlarging seaward, as it takes possession of the growing delta of the river Sumida, on whose south bank it is situated. The lower portion of the city, which is flat and intersected by canals, stretches between the two parks of Ueno (north) and Shiba (south), famous for their shrines and as alternate burial-places of the Tokugawa Shōguns. Midway rises the castle, the central buildings of which were burned in the restoration troubles, now the site of the palace (1889), a fine structure in Japanese style, furnished *à l'Européenne*, and lit with electricity. Its double ring of high walls and broad moats is finely picturesque. In spring-time the city is gay with plum and cherry blossoms, the river-side avenue of Mukojima, 5 miles long, presenting a unique spectacle. The immense inclosures (*yashiki*) formerly inhabited by the nobles and their retainers are gradually disappearing, and handsome modern buildings in brick for the use of the various government departments are taking their place. Of the fifteen city divisions (*ku*) the northern, Hongo and Kanda, are mostly educational, and contain the buildings of the Imperial University, First Higher Middle School, Higher Normal School, Law School, &c. The student population is astonishingly large, and is an element of danger, as the lads are almost wholly without proper parental or other control. The seaward districts of Nihonbashi, Kyobashi, and Asakusa are industrial and commercial, while the government offices are located in Kojimachi *ku*. The plain but nicely finished buildings in which the first Japanese parliament met in 1890 were consumed by fire in 1891, but have since been rebuilt. There is an anchorage at Shinagawa, the southernmost suburb of the city, but Yokohama is the port of entry (17 miles off). The climate of Tōkyō is moist and unhealthy in summer, but is generally fine and healthy from September to the beginning of June. The winter nights are cold, and the keen winds of spring sweep the dust violently through the streets. The city is subject to disastrous fires; that of April 1892 burned 4000 houses in one morning. Tōkyō has two railway termini 5 miles apart—Shimbashi, connecting it with Yokohama and the south; Ueno, connecting

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it with Nikko and the north. A suburban railway unites the two systems. *Jinrikishas*, small two-wheeled carriages drawn by men, are the chief means of conveyance; but tramcars and buses crowd the principal thoroughfares and connect the scattered districts. There is a foreign concession at Tsukiji, on the south bank of the Sumida, mostly inhabited by missionaries. The foreign population of Tōkyō is about 800, foreign employees and missionaries. Tōkyō resembles Paris in the overshadowing importance of its place in the national life; it is alive with new schemes and undertakings, and almost every phase of modern industrial civilisation is to be found within its vast area. Pop. (1890) 1,376,280. See JAPAN.

Toland, JOHN, deistical writer, was born of Catholic parents near the village of Redcastle, County Londonderry, November 30, 1669. He entered the university of Glasgow in 1687, but removed to Edinburgh, where he abandoned the Roman Catholic faith and took his M.A. in 1690. At Leyden, where he spent two years, he studied theology under Spanheim. He resided for some time at Oxford, and in the Bodleian collected the materials of more than one of his later publications. In *Christianity not Mysterious* (1696) he expressly claimed to accept all the essentials of Christianity, but maintained that the value of religion could not lie in any unintelligible element, and that no part of the truth could be contrary to reason. He chose his title with evident reference to Locke's *Reasonableness of Christianity* (1695), and professed to have at heart the defence of revelation against deists and atheists. But the tendency of the work was obvious; it created a great sensation in the theological world, and led to several replies (by Payne and Stillingfleet amongst others). Prosecuted in Middlesex, Toland returned to Ireland, where his book was burned publicly by the common hangman, and Toland fled to London. In *Amyntor* (1699) and other works he fairly raised the question as to the comparative evidence for the canonical and apocryphal scriptures, with professed candour but unmistakably mischievous intent. A pamphlet entitled *Anglia Libera*, on the succession of the House of Brunswick, led to his being received with favour by the Princess Sophia when he was secretary to the ambassador at the court of Hanover; and from 1707 to 1710 he lived in various continental towns. His after life was that of a literary adventurer, and forms one of the most painful chapters in D'Israeli's *Calamities of Authors*. In *Nazarenus* (1720) he insisted, somewhat on the lines developed by Semler and the Tübingen school, that there were two distinctly opposed parties in the early Christian church—one Judaistic (which he identified with the Ebionites) and one Pauline or liberal. His *Pantheisticon* was an offensive parody of the Anglican liturgy. He resided from the year 1718 at Putney, where he died, March 11, 1722.

Besides the works named, and various defences, apologies, and pamphlets, he wrote a life of Milton (1698); an *Account of Prussia and Hanover* (1705); *Adeisidæmon* (1709); *Origines Judaicæ* (1709). See the books cited under the heading DEISM in this work; and for Toland's partial anticipation of Semler and Baur, see an article in the *Theological Review*, 1877. There is a life by Des Maizeaux prefixed to two vols. of Toland's posthumous works (1747, including a *History of the Druids*), and a monograph by Berthold, *John Toland und der Monismus der Gegenwart* (Heidelb. 1876).

Toledo, a famous city of Spain, capital of a province, and long the capital of the whole country, stands on the north bank of the Tagus, by which it is encompassed on three sides, 40 miles SSW. of Madrid by rail. It is situated on a number of hills, 2400 feet above sea-level; and the climate, excessively hot in summer, is bitterly cold in winter. The Tagus, surrounding the city on the east, south, and west, and flowing between high and rocky banks, leaves only one approach on the land side, which is defended by an inner and an outer wall, the former built by the Gothic king Wamba in the 7th century, the latter by Alfonso VI. in 1109, and both remarkable for the number and beauty of their towers and gates. Seen from a distance the city has a most imposing appearance; within it is gloomy, silent, inert, and its narrow streets are irregular, ill-paved, and steep. In the middle of the city rises the lofty, massive cathedral, surrounded by numerous churches and convents, mostly deserted. The cathedral, built in 1227–1493, on the site of a former mosque (consecrated to Christian uses in 1086, but pulled down to make way for the new church), is a large oblong edifice with semicircular apse, and belongs to the simplest, noblest style of Spanish-Gothic, with a few touches of the florid Gothic, classical, and Saracenic styles. The interior is more impressive than the exterior, which is blocked by other buildings on all sides save one. It was ransacked and plundered in 1621 and 1808, but it still contains some admirable stained glass, and the choir is a perfect museum of sculpture. The cathedral is 404 feet long and 204 feet wide, and has five naves; the tower is 329 feet high. Connected with the cathedral are an extraordinary number of chapels, of great interest, alike from their architectural beauty, their decorations, and their historical associations. The great square or Zocodover, thoroughly Moorish in its architectural character, is a fashionable promenade, and was long the site on which heretics were burned and bull-fights took place. Moorish architecture is conspicuous in some churches, and in two gateways. The Alcazar or old palace, the fortress commanded by the Cid, rebuilt as a palace in the time of Charles V. and subsequently, occupied the highest part of the city, but was burned down in 1887. The buildings of the town include a theological seminary, one or two old palaces, hospitals, what was once a great monastery, town-hall, &c. There are manufactures of church ornaments and vestments in gold, silver, and silk, and confections. The best Spanish is said to be spoken here. Toledan sword-blades, famous since old Roman times, are still made, but outside the city. Pop. (1887) 20,837.

Toledo, the *Toletum* of the Romans, is of very early origin. It was the capital of the Goths during their dominion; in 714 it fell into the possession of the Moors, who retained it till 1085, when it was permanently annexed to the crown of Castile as capital. In the days of its highest prosperity it is said to have contained 200,000 inhabitants. It was the headquarters of the Inquisition. The university, founded in 1498, is long since extinct. The whole place has now a dilapidated and broken-down appearance. For the area and pop. of the province, see SPAIN, Vol. IX. p. 598.

Toledo, capital of Lucas county, Ohio, on the Maumee River, 8 miles from the western extremity of Lake Erie (to which a channel 17 feet deep has been dredged), and 92 by rail W. of Cleveland. It has a fine harbour, is on the Miami and Erie Canal, and is connected with all parts of the country by thirteen railways. Besides an immense union depôt, it has grain elevators holding 5,000,000 bushels, and a great trade is done in flour and grain, as well as lumber, live-stock, hides, wool, iron, cotton, and tobacco. There are great wagon-works, foundries, manufactories of boilers, pumps, engines, farming implements, and furniture, and boat-yards and bridge-works. Toledo was settled in 1832, and incorporated in 1836. Pop. (1880) 50,137; (1890) 81,434.

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Toledoth Jeshu (Heb., 'the generations of Jesus'), an apocryphal work in Hebrew purporting to be a history of Jesus; really a mediæval series of clumsy, fragmentary, ribald fictions and burlesques. There are two recensions, of one of which Wagenseil published a Latin translation in 1681. This one may probably contain an ancient element; the other, which Huldrich translated into Latin in 1705, is not older than the 14th or 15th century.

See Baring-Gould, *The Lost and Hostile Gospels* (1874); *Notes and Queries*, 6th series, vol. xi. (1885) p. 212.

Tolentino, an episcopal city of Central Italy, 10 miles SW. of Macerata. Pop. 4888.

Toleration is the liberty conceded, especially where a particular form of religion is established by law, to those of other religious beliefs to publicly teach and defend their theological and ecclesiastical opinions, and to worship whom and how they please, or not at all. But no permission is thereby given to violate the rights of others, or to infringe laws designed for the protection of decency, morality, and good order, or for the security of the governing power. In Britain there are still in force certain statutes imposing penalties on opinions and practices, once regarded as criminal because of their offensiveness to God, such as Blasphemy (q.v.); but these laws are seldom executed now, the opinion having become prevalent that, except when the religious feelings of the public are so wantonly outraged as to make the perpetrator a nuisance, theological error is best opposed by refuting it, and that when those accused of Heresy (q.v.) are men of piety and earnest conviction any degree of severity short of extirpation tends rather to diffuse than to suppress their tenets. The right of private judgment in matters of faith and worship is now more generally recognised in practice than it used to be, though even yet many resent the exercise by their neighbours who differ from them of the freedom which they claim for themselves. In a church claiming infallibility, and believing that salvation is unattainable beyond her pale, it is not only consistent, but to her more earnest members must seem a duty, to prevent by force the spread of what is accounted a fatal heresy; and, in fact, toleration has never been either professed or practised by the Church of Rome. The Reformers, as a whole, while claiming freedom for themselves, by no means accepted the principle of tolerating what they regarded as pernicious doctrines: a notable case to the contrary is Calvin's treatment of Servetus (q.v.). The peace of Westphalia (1648), which closed the fearful Thirty Years' War, secured a religious and civil freedom in Germany for Catholics, Lutherans, and Calvinists, but for no others. Even the English Puritans, though long oppressed themselves, were so blind to the right of others to differ from them that in their own brief day of power they eagerly repudiated, by word and deed, as a monstrous and impious error, the principle of a universal toleration. In the Westminster Assembly of Divines (1643–46) the Presbyterian members fought successfully against the proposal of the Independents that all sects should alike be tolerated. 'We hope,' wrote Baillie to his Presbyterian friends in Scotland, 'that God will assist us to demonstrate the wickedness of such a toleration.' George Gillespie's view was similar. We accordingly find in the 23d chapter of the *Westminster Confession* an assertion of the duty of the magistrate to promote the true religion, and to restrain and punish heterodoxy—a principle which, soon after the Restoration, was found to work very inconveniently for the Presbyterians themselves, the magistrate being then one who differed from them as to what the true religion was. The Independents, on the other hand, had learned the lesson of toleration in Holland—that nursery of liberty in modern Europe—whither they had fled from oppression in the reign of James I. It is, however, a mistake to suppose that they were the first to understand and practise the principles of religious freedom, for in the 16th century Zwingli and some of the Hungarian reformers disclaimed, by word and action alike, the notion that any man is entitled to assume, in his dealings with others, that his own interpretations of Scripture are true, and those of other men, if different, false and culpable.

The English sectaries who founded the American colonies, fleeing from religious intolerance, brought with them no larger toleration for others. In most New England states dissent was punished as heresy, though Roger Williams insisted that 'to punish a man for any matter of his conscience is persecution.' In Pennsylvania no man could hold office who did not acknowledge the deity of Christ; and in Maryland Quakers were fined and variously punished from 1659 onwards. To the keen discussions in Holland and England during the century which followed the Restoration; to the moderation or indifference which characterised the Protestant churches a hundred years ago; to the ever-increasing number and power of dissenters; to the enormous impulse given to the notion of personal rights by the French Revolution; and to that wider mental culture which enables men to see that diversity of mental gifts and acquirements naturally leads to diversity of opinion, it is that we must ascribe the tolerant spirit now generally diffused, especially in England and the United States. Not only is the *right* of free thought and discussion now generally recognised, but its *necessity* to the well-being of mankind is asserted by eminent thinkers. And in most civilised countries, though churches may be limited in their privileges, private freedom is accorded to all religious belief: Russia is of great Christian nations the most intolerant.

See Jeremy Taylor's *Liberty of Prophesying*; Milton's *Areopagitica*, his *Treatise of Civil Power in Ecclesiastical Causes*, and his treatise *Of True Religion, Heresy, Schism, Toleration, &c.*; John Owen's *Indulgence and Toleration Considered*; Barclay's *Apology for the Quakers*; Locke's *Letters concerning Toleration*; Paley's *Moral Philosophy*; Sydney Smith's *Letter to the Electors on the Catholic Question*; Martineau's *Rationale of Religious Enquiry*; Guizot's *History of Civilisation in Europe*; Buckle's *History of Civilisation*; Mill *On Liberty*; Lecky, *Rise of Rationalism* and *History of European Morals*; Bancroft, *History of the United States*; the church histories; and in this work the articles CATHOLIC EMANCIPATION, JEWS, PERSECUTION, works cited at FRIENDS, &c.; also SIDNEY (ALGERNON).

The ACT OF TOLERATION was an act passed after the English Revolution of 1689, with the hearty support of William III. It repealed the persecuting acts of Charles II.'s reign against conventicles, &c., and practically gave religious toleration to Protestant dissenters and Quakers, but expressly excluded Roman Catholics or anti-Trinitarians.

Toll, an old English word used for tax or tribute ('to whom tol tol;' Wyclif's Bible, Rom. xiii. 7), especially for long (like the German *Zoll*) applied to customs duties, but ultimately almost wholly restricted to money paid for the maintenance of roads by persons using them, and collected from travellers by collectors at toll-gates or toll-bars. Road-tolls were granted by Edward III., and the turnpike soon spread itself over all England, superseding 'statute-labour' in Scotland in 1750. The Rebecca Riots (q.v.) of 1843 were but one instance of the unpopularity of the impost; but in 1871 there were in most parts of the country toll-houses

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every six or eight miles, and about 5000 persons employed as toll-collectors (not including their families). A board affixed to the toll-house indicated the varying rates of dues exacted for an ass, a score of sheep, a riding horse, a cart, a one-horse gig, a carriage drawn by two horses, &c. Ireland first threw off this form of the burden, an act of 1857 abolishing the last in the island. In England twenty-seven toll-bars near London were abolished, and eighty-one on the north side of London in 1864, sixty-one on the south side in 1865. Others followed (in Scotland, in 1883, under the Roads and Bridges Act, 1878), but it was not till 1889 that the system in Great Britain was finally superseded by the mode of management now in force, for which see ROADS. Bridge-tolls were all abolished in London in 1878–79, but they still survive in some places, and pier-tolls are common.

Tollens, HENDRIK, a Dutch poet. See HOLLAND, Vol. V. p. 745.

Tolosa, a town in the northern Spanish province of Guipuzcoa, 15 miles S. of the seaport of San Sebastian by rail. Pop. 7239.—*Tolosa* is also the ancient name of Toulouse.

Tolstoi, or TOLSTOY, a noble Russian family, several of whose members have become eminent in diplomacy, war, and literature. Count Peter (1645–1729) was long a trusted agent of Peter the Great; Count Peter Alexandrovitch (1761–1844), one of Suvorof's generals, was under Nicholas I. head of a government department; Count Alexei Constantinovitch (1818–75) was one of the foremost of modern Russian dramatists, a lyrical poet and novelist (his historical novel, *Prince Serebrenni*, was translated into English in 1874); Count Dmitry Andreievitch (1823–89), reactionary minister of Education, was a champion of Russian orthodoxy and the Russifier of the Poles, whose *Romanism in Russia* was translated in 1874. But far better known outside of Russia is

COUNT LEO NIKOLAIEVITCH, poet, novelist, social reformer, and religious mystic, born 28th August (o.s.) 1828, at Yásnaya Poliána in the government of Tula. He was educated privately at Moscow, and on the family estate till 1843–46, when he studied at Kazan University; in 1851 he joined the army of the Caucasus on the Terek, was attached to the staff of Prince Gortschakoff in Turkey in the first stage of the Crimean war, and was at the storming of Sebastopol by the allies in 1855. He now retired from the army, and, already famous as a poet and novelist, spent a short time in the most brilliant literary and social circles of St Petersburg. He then travelled in Germany and Italy; in 1862 he married, and since then has lived on his estates near Moscow amongst the peasantry.

It was during his residence in the Caucasus that he wrote *Childhood, Boyhood, and Youth*, *Memoirs of Prince Nekludoff*, and *The Cossacks*. After the Crimean war he wrote three sketches of Sebastopol; during his foreign sojourn, *The Snow Storm*, and the *Two Hussars;* next came *Family Happiness*, *The Three Deaths*, and *Polikushka*. The first of his two great works, *War and Peace* (1865–68), gives a marvellously vivid picture of the Napoleonic campaigns against Russia and the national defence; like many Russian novels, it is devoid of a regular novelistic plot, and is a kind of chronicle of two families and their friends, showing how their fates and characters were moulded by the events of that terrible time. The other great work, *Anna Karenina* (1875–78), is a melancholy tale of an ill-fated marriage, in which the inability to recognise the prosaic responsibilities of life leads to the suicide of the unhappy wife. It is, as Mr Arnold said, less a work of art than a piece of life; but what it loses in art it gains in reality. 'There is an abundant and admirable exhibition of knowledge of human nature, penetrating insight, fearless sincerity, wit, sarcasm, eloquence, style.'

Soon after this he intimated to the consternation of his friends that he had finally resolved to renounce the career of poet and artist to devote himself to studying the pressing problems of life, remedying its grievances, and becoming the 'friend of the unfriended poor.' Since that time he has not ceased to write, nor even to write novels, but all his work is written with directly didactic aim. *Ivan Ilyitch*, *What People Live by*, *Where Love is there God is also*, *Two Pilgrims*, *The Dominion of Darkness*, *The Christianity of Christ*, *What I Believe*, and *Life*—all insist on a mode of thought and ideal of life in which revolutionary discontent and religious confidence, Puritanism and Quietism, hyper-Christian self-devotion and an almost Buddhist resignation, deep insight and morbid asceticism are strangely combined and commended by the author's literary power, transparent sincerity, and self-denying tenderness for all the weary, heavy-laden, and oppressed. True religion (not dogmatic orthodoxy) is for him the most valuable element in life, and, though rare in the cultivated, is common if not ineradicable in the working poor, in the people. His conception of Christ's Christianity is summed up in six canons: Do not war; do not judge; do not commit fornication; do not swear; do not give way to anger; do not oppose with force the evil-doer—this last carried to the point of not interfering by force to prevent a murder. The *Kreutzer Sonata* (1890) finds the trail of the serpent—carnal passion and baseness—not merely in most existing social conditions, but in art as now practised, and even in what for others are the sanctities of family life. Another work on *War* appeared in 1892. Tolstoi has resigned all social standing and privileges of rank, and devoted most of his wealth to good works, and lives as poorly as a peasant. Turgenief and Tolstoi, with many points of sympathy, never could agree, and had more than once a bitter quarrel; but on his deathbed Turgenief sent a loving message to 'Leo Nikolaievitch' beseeching him to return to literature. During the famine of 1891–92 Tolstoi had abundant opportunity of exercising his inexhaustible beneficence in personally ministering to the wants of the starving poor, and suffered seriously in health from his unwearied labours.

See Matthew Arnold, *Essays in Criticism* (2d series, 1888); De Vogüé, *Le Roman Russe* (1888); C. E. Turner, *Count Tolstoi as Novelist and Thinker* (1888); and the fuller life by Rafael Loewenfeld, *Leo Tolstoi, sein Leben, seine Werke, seine Weltanschauung* (Berlin, 1892). His principal works have been translated into English, and most are found in separate American translations.

Toltecs. See MEXICO.

Tolu. See BALSAM.

Tolúca, a town of Mexico, capital of Mexico state, and 45 miles by rail WSW. of Mexico city, lies in a valley nearly 8800 feet above the sea, contains a fine cathedral, manufactures paints, soap, and candles, and has a thriving trade in pork, sausages, &c. Pop. 12,000. Near the town is the extinct volcano, Nevado de Tolúca (see MEXICO, p. 166).

Toluol, or TOLUENE, another name for Methyl Benzene (see AROMATIC SERIES, BENZENE), a colourless liquid with the odour of benzene, which dissolves sulphur, iodine, and many resins. It is obtained from the dry distillation of tolu or other resin, by the action of potash on benzylic alcohol, by heating toluic acid with lime, and as a coal-tar product. From it Saccharin (q.v.) may be obtained. Toluidin is a derivative of Toluol.

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Tomahawk, a light war-hatchet of the North American Indians. The early ones were made of stone or of deer-horn put through a handle of wood, or fastened to the handle by sinews or cords of skin; European traders supplied hatchets of steel. The blunt side of the head was sometimes made hollow, for a tobacco-pipe, a handle of ash, with the pith removed, being the stem. Tomahawks might be either used in close combat or thrown so that the edge would strike the object aimed at. The usage of the Indians supplies the phrases to bury the hatchet and to dig it up, as equivalents for to make peace or to declare war.

Tomato, or LOVE-APPLE (*Lycopersicum esculentum*), a plant of the natural order Solanaceæ, so named by Tournefort, but subsequently combined by Linnæus with the genus Solanum, now, however, recognised as a distinct genus under the name of the earlier botanist. It is distinguished from Solanum by the stamens having the anthers connected by a thin membrane, and by their cells opening in longitudinal slits on the sides, not in pores at the apex as in that genus. The fruit is fleshy, usually red or yellow, divided into two, three, or more cells containing numerous seeds imbedded in pulp. The tomato is one of a genus of several species, all natives of South America, chiefly on the Peruvian side. It is the only species in cultivation in Europe, into which it was brought by the Spaniards in 1583. In the warmer countries of Europe, the United States, and other countries in which the summer is warm and prolonged, it has long been cultivated for the excellent qualities of the fruit as an article of diet. Although belonging to a natural order of plants usually regarded with suspicion on account of the powerfully poisonous

Large Early Red Tomato:
a, fruit of do.; *b*, fruit of common tomato.

properties of many of the species comprised in it, it is now recognised as one of the most important and valuable of vegetables grown for human food. Though it was introduced into Britain as early as 1596, the consumption of its fruit there is still small as compared with some other European countries and America, but it has increased immensely since 1880. The annual supply produced in Britain is quite inadequate to meet the demand, which is yearly increasing as the agreeable qualities of the fruit become more widely known; consequently enormous quantities of it are imported, packed dry and in tins, the latter being chiefly used in making soups and sauces. The imported fruit, having to be packed in an imperfectly ripe state in order to reach its destination in safety, is inferior to that grown in Britain in colour, flavour, and texture; the latter, therefore, commands the highest price in the market. On this account the culture of the tomato has of late years developed into a distinct horticultural industry, like grape-growing and mushroom-growing. Very extensive establishments in glass have been erected at Worthing in Sussex and at other places in England and in Scotland exclusively for its culture, which proves a remunerative enterprise. The plant is annual in duration, and too tender to be grown successfully in the open air in Britain, except it is reared in heat and grown in pots to the flowering stage under glass before the beginning of June, the earliest period at which it may be safely turned out of doors. Even then it must be planted against a wall with a warm exposure and well sheltered. The seeds are sown in February and March in a temperature of 55° to 65°. An open friable soil is essential, and the use of potash as a manure is hardly less so. The details of management cannot be entered into here. Like its near relative the potato, the tomato is subject to attacks of phytophthora—the potato-disease fungus, and the fruit is liable to a disease also of fungus origin, which causes considerable loss to inexperienced growers, but rarely attack the plants of those who understand their treatment under glass.

The fruit is cooked in a great variety of ways: broiled or fried by itself, or with meat or other accompaniments; made into soups and sauces; sliced raw, it is an excellent ingredient in salads, and eaten with vinegar and pepper and salt uncooked it is perhaps as wholesome and refreshing as in any other way. Its use in any way as food is considered beneficial in affections of the liver, indigestion, and diarrhœa. The word tomato is derived from the Spanish-American name *tamate*, and the English name Love-apple has arisen from its supposed aphrodisiac properties.

Tomb (Gr. *tymbos*), a monument erected over a grave, in order to mark the resting-place, and preserve the memory, of the deceased. In early ages, and among eastern nations, it sometimes became the practice to place the remains of the dead in excavated sepulchres, whose interior was often decorated with painting or otherwise. Where the usage was to burn the dead their bones and ashes were placed in urns in these receptacles. Some of the most remarkable rock-tombs were those of Egypt. The rock-tombs of Persia and Lycia have imposing architectural façades. See also CATACOMBS, ETRURIA, PETRA.

Tombs in more modern times have generally been mounds or masses of building raised over the remains of the dead. In the Homeric poems heaps or cairns of stones are placed as honorary memorials above the graves of departed heroes. The tumulus of rude ages (see BARROW, CAIRN) is found over the greater part of northern Europe, and is probably older than the subterranean tomb. The Pyramids (q.v.) were the sepulchres of the Egyptian monarchs from the 4th to the 12th dynasty. The tombs of Greece, and still more those of the Greek colonies in Asia Minor, were sometimes pillars, or upright stone tablets, sometimes small buildings in the form of temples; the most celebrated was the Mausoleum (q.v.). The Roman tombs were not unfrequently important architectural structures, varying in form, but oftenest consisting of a circular tower resting on a square basement; familiar examples being the tomb of Cæcilia Metella (see ROMAN ARCHITECTURE), and the yet larger and more solid tomb of Hadrian, on the banks of the Tiber, best known as the castle of S. Angelo, which is about 220 feet in height, and of immense solidity. The tombs were generally erected outside the towns, and along the principal roads leading into the country, as in the Via Appia at Rome, and the Street of Tombs at Pompeii. A form of excavated tomb, without external architec-

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ture, called Columbarium (q.v.), was also in use in Rome, whose walls were pierced with cells to receive cinerary urns. The prevalent circular tomb became in the later period of the Roman empire polygonal. In many parts of Italy, and in such Spanish-American towns as Lima and Quito, the cemeteries contain rows of niches rising above one another in terraces, honeycomb-like, and each holding a coffin, which rests there so long as the heirs pay the rent.

In the earlier centuries of Christianity the burial of the dead in churches was prohibited. The first step which led to its adoption was the custom of erecting churches over the graves of martyrs; then followed the permission to kings and emperors to be buried in the church porch. The most important tombs of the middle ages are generally within churches or cloisters. The earlier examples consist of a simple stone coffin, or sarcophagus, often with a low gabled lid and a sculptured cross. An altar-tomb, or tomb in the form of a table, followed; and in the 13th century a species of tomb was introduced, consisting of a sarcophagus, on which rests a recumbent figure of the deceased, the whole being surmounted by a canopy, often of exquisite symmetry and richness (see illustration at CANOPY). The tombs of the Scaligers at Verona, with their beautiful wrought-iron railing, are famous. In the renaissance period of art the tombs became more and more complex. The sarcophagus was disguised, or made the least important part of the monument; the representation of the deceased was confined to a medallion likeness, and the most prominent part of the tomb was composed of sculptured upholstery, and groups of symbolical and eventually mythological figures. In some of the 16th-century examples, as Michaelangelo's tombs of Giuliano and Lorenzo di Medici, at Florence, the inappropriateness of the design is partly redeemed by the beauty of the figures; but in the succeeding centuries the vicious taste of these monuments rapidly increased, till it culminated in some of the hideous tombs that disfigure Westminster Abbey and St Paul's. See also the articles BURIAL, CEMETERY, NECROPOLIS, and others cited at MONUMENTS.

Tombac, a name given to an alloy of copper and zinc like Prince's Metal (q.v.), or to an alloy of copper and arsenic.

Tombigbee. See ALABAMA.

Tomi. See OVID.

Tompkins, DANIEL D. (1774–1825), was vice-president of the United States from 1817 to 1824, but is most noteworthy for his energetic organisation of the militia of New York state—of which he was governor from 1807 to 1817—during the war with Great Britain.

Tomsk, a town of western Siberia, on the Tom, a tributary of the Obi, 2809 miles E. of St Petersburg. Situated on the great trading highway of Siberia, and on the great trade-route from Tiumen to Irkutsk, it is the seat of an important transit trade. Leather and carriages are manufactured; and a university was established in 1888 (see SIBERIA, p. 429). Great part of the town was burned in 1890. Pop. 36,742.—The *government* of Tomsk, extending to the Chinese frontier, has an area of 331,159 sq. m.—nearly twice the size of Great Britain and Ireland. Pop. (1889) 1,299,729.

Tom-tit. See TIT.

Ton, the same word as Tun (q.v.), denotes a weight of 20 hundred-weight (*cwt.*). In Britain the hundred-weight contains 112 lb., so that the ton contains 2240 lb. In the United States the hundred-weight is usually reckoned at 100 lb., and the ton (the 'short' ton) at 2000 lb. Ton is also a measure of capacity, varying with the substance measured—timber, wheat, gravel, lime, coke, &c. For the ton used in measuring ships, see TONNAGE.

Tonalite, an igneous rock having a granitic structure, and composed essentially of plagioclase, biolite, and quartzite. Hence it is simply a quartz-mica-diorite.

Tonawanda, a town of New York, on the Niagara River and Erie Canal, 8 miles N. of Buffalo by rail. It contains several mills and other manufactories. Pop. (1890) 7145.

Tonbridge. See TUNBRIDGE.

Tone, in Music. See INTERVAL. For the Gregorian Tones, see PLAIN-SONG.

Tone, THEOBALD WOLFE, Irish patriot, was born the son of a coach-maker in Dublin, 20th June 1763. He had his education at Trinity College, Dublin, entered the Middle Temple, and was called to the bar early in 1789. But he soon plunged into political intrigues, acted some time as secretary of the Catholic Committee, and had a large share in the organisation of the United Irishmen. His active mind was impatient of constitutional methods, and from an early period of his career he dreamt of foreign invasion as the remedy. Naturally he found it necessary to take refuge, first in America, next in France. He laboured incessantly to induce the Republican government to take up the scheme of an invasion of Ireland, and held a command in the unlucky expedition under Hoche. In 1798 he again embarked in a small French squadron, which after a fierce fight was captured. Tone was taken to Dublin, tried, and condemned to be hanged as a traitor. He cut his throat in prison, 19th November 1798. His autobiography, edited by his son, an officer in Napoleon's army, and afterwards in the United States service, appeared at Washington in 1826. It is an interesting revelation of a mind of remarkable activity, and a character ruined by inordinate self-esteem and reckless unscrupulousness.

See his *Autobiography* (new ed. by Barry O'Brien, 1892); the Life in Dr Madden's *United Irishmen* (3d series, vol. i. 1846); and, as an antidote, two papers by the Duke of Argyll in the *Nineteenth Century* for May and June 1890.

Tonga. See FRIENDLY ISLANDS.—Tonga Bay is a small inlet on the east coast of Africa, bounded on the N. by Cape Delgado.—Tongaland is a native state on the east coast of South Africa, to the north of Zululand. Area, 1170 sq. m.; pop. 100,000.

Tongariro. See NEW ZEALAND, p. 486.

Tongking, TONQUIN, or TONKIN, since 1884 a French possession, is the north-east portion of the Indo-Chinese peninsula (see map at BURMA), bordering on China. The name has been used for various areas in this region. The various usages of the word, its physical geography, ethnography, and history are described at ANNAM, of which country it is naturally part. As is there mentioned, the main feature of the country is the Song-coi or Red River (variously spelt Song-koi, Sang-koi, &c.), coming from Yunnan, and traversing the whole of Tonquin lengthwise. The area is 34,700 sq. m.; the pop. was estimated in 1891 at 9,000,000. The capital is Hanoi (q.v.). The chief produce is rice, silk, sugar, pepper, oil, cotton, tobacco, and fruits, with some copper and iron; and companies are now working coal and antimony mines at one or two places on the coast, especially near the chief port of Haiphong. The imports in 1890 had a value of 27,735,000 francs (one-fourth only from France), the exports of 13,325,000 francs (only a small fraction to France). The French scheme of tapping the resources of Yunnan by means of the Song-coi has proved impracticable, the navigation of the upper course being very difficult

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and at times impossible. The unpopularity of the Tongking expedition, and the tediousness of the war it led to, brought about the fall of Jules Ferry (q.v.), nicknamed 'le Tonkinais.'

See C. R. Norman, *Tonkin; or, France in the Far East* (1884); J. G. Scott, *France and Tongking* (1885).

Tongres, a very ancient episcopal city of Belgium, in the province of Limburg, 12 miles NW. of Liége. The church of Notre Dame was built in 1240, but its cloister dates from the 10th century. There is a mineral spring in the vicinity, mentioned by Pliny. Pop. 8763.

Tongue, a symmetrical, muscular organ, extending from the hyoid bone upwards and forwards to the lips in front, and occupying the buccal cavity. The superior surface, borders, and anterior third of the inferior surface are free; elsewhere it is attached to adjacent parts by the investing mucous membrane and subjacent structures. At certain points this membrane forms distinct folds, containing fibrous or muscular tissue, which act to a certain extent as ligaments to the tongue. The most considerable of these folds is termed the *frænum* (or bridle) of the tongue, and connects its anterior free extremity with the lower jaw. It acts as a strong ligament, and limits the backward movement of the tip of the tongue. In very rare cases this ligament extends abnormally to the tip, so as to interfere with speech and mastication, and the child is said to be 'tongue-tied;' recourse must be then had to division of the frænum, popularly known as 'cutting the tongue.' Other folds of mucous membrane pass from the base of the tongue to the epiglottis; while from the sides of the base, passing to the soft palate, are seen two folds on either side, the 'pillars of the fauces' (see PALATE). The superior surface of the tongue is divided into two symmetrical lateral parts by a median longitudinal furrow, commencing at the tip, and extending back about two-thirds of the tongue's length. The various kinds of papillæ on their surface are described in the article TASTE. At the back of the surface, just behind the circumvallate papillæ, are large mucous glands, extending into long and capacious canals, and helping to secrete the fluid that moistens the tongue. On the inferior surface the longitudinal furrow, which extends from the tip to the frænum, is deeper than on the upper surface; on each side of it veins are seen running forwards; and immediately beneath the tip is a cluster of mucous glands, known as the glands of Nuck (their discoverer in 1690). The posterior extremity, or base, is flattened and extended laterally before it is inserted into the hyoid bone (known also as the lingual or tongue bone), which, with certain ligaments, must be regarded as the basis or framework of the tongue. The muscles of the tongue are usually divided into two groups—viz. the extrinsic muscles, which attach the tongue to certain fixed points external to it, and move it on them; and the intrinsic muscles, which pass from one part of the tongue to another, constitute its chief bulk, and move it on itself. These intrinsic muscular fibres run vertically, transversely, and longitudinally, and are so interlaced as mutually to support one another, and to act with the greatest advantage. By the action of the various muscles, the upper surface of the tongue may be made concave or convex, or may be pressed against the roof of the mouth; the tip may be protruded straight out or laterally, upwards and downwards, and into any recess. The organ is freely supplied with blood, mainly by the lingual artery, which is given off by the external carotid. With regard to the nerves, the glosso-pharyngeal and certain branches of the third division of the fifth nerve are concerned in the special sense of taste; other branches of the fifth nerve are concerned in ordinary sensation, while the hypoglossal nerve on each side is the motor nerve of the tongue.

Upper Surface of Tongue: 1, mesial line; 2, 2, lateral parts; 3, tip; 4, 4, sides or edges; 5, 5, V-shaped mass of circumvallate papillæ; 6, foramen cæcum; 7, mucous glands; 8, epiglottis; 9, 9, 9, frænа epiglottidis; 10, 10, greater horns of hyoid bone. (From Soemmering.)

The tongue in mammals does not differ very materially from that of man; but in general there is a close coincidence both in size and form between this organ and the lower jaw. In the rodents the tongue has a wedge-like shape. In the giraffe and the ant-eater the tongue is much prolonged, being an important prehensile organ in the former, while in the latter it is driven into ant-hills, and the victims are secured by its viscid secretion. In the feline races the conical papillæ are converted into recurved spines of great size and strength, which the animal uses in scraping bones and in combing its fur. Except in mammals, the tongue is probably not an organ of taste. The Gasteropoda are provided with a very singular apparatus known as the tongue, and consisting generally of a thin membrane, long and narrow, and rolled, except at its anterior extremity, into a tube; this membrane is covered on its upper surface with transverse rows of minute teeth, or more commonly with plates having tooth-like siliceous projections. The Articulata do not present anything like a true tongue, although in insects a certain oval appendage is described as a *lingua*.

The functions of the tongue are gustation, prehension (in man and monkeys this function is supplied by the hand), mastication, insalivation, deglutition, and speech; to which may be added spitting and whistling, and in the case of the Gasteropoda the trituration of the food.

In its medical relations the tongue is of great importance as an index to the condition of the system, and particularly of the digestive organs; its appearance, whether firm or flabby, moist or dry, clean, furred, or unduly red and bare, is a valuable guide both as to the diagnosis and treatment of disease.

Amongst the diseases of the tongue may be mentioned *Inflammation* or *Glossitis*. The most marked characteristics of this affection are great swelling, tenderness, and difficulty in speaking and swallowing. It rarely occurs as an idiopathic or spontaneous affection, but often used to accompany severe salivation. It must be treated by purgatives and low diet, and by gargling, as in ordinary salivation (see SALIVA). Incisions are sometimes useful, both to relieve tension, and by the depletion that ensues. Abscess in the tongue is also occasionally met with.

Hypertrophy, or persistent enlargement of the tongue, sometimes seems to result from an imperfectly cured inflammation, but is probably in most cases congenital, although perhaps not noticed for a year or two. It sometimes attains an enormous size, but can generally be relieved by operation, at least in its earlier stages. A good deal of attention has been given during recent years to a condition called

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leucoplakia, consisting in whitish spots or patches on the surface of the tongue, very chronic in their course, often traceable to some irritation, particularly smoking, and especially important because they not infrequently become the seat of cancer. One of the most common forms of disease of the tongue is *ulceration*, which may arise (1) from the irritation of a decayed tooth with a sharp jagged edge; or (2) from constitutional syphilis; or (3) from a disordered condition of the digestive organs. In the first case the tooth or its edge must be removed; in the second iodide of potassium with sarsaparilla should be tried; and in the third the complaint generally yields to regulation of the diet and of the digestive organs. *Cancer* is by far the most common tumour met with in the tongue, and is nearly always of the epithelial variety. It is frequently connected with some cause of irritation—e.g. from a broken tooth, or from excessive smoking—and is very much more common in men than in women. It is in general a rapidly fatal form of cancer; and operations for its removal, always serious, are less often followed by immunity than in some other organs. See Butlin, *Diseases of the Tongue* (1885).

Tonic, in Music. See KEY.

Tonics are medicines which, in cases of want of *tone* in the system, are employed to restore its strength and vigour. Tonics, to a certain degree, are stimulants; but while the latter produce a rapid but transitory excitement, the former slowly induce a certain degree of excitement, and the effect is permanent. Most tonics, in which category we must place the shower-bath, cold sea-bathing, open-air exercise, friction, &c., as well as drugs, act primarily through the nervous system, and secondarily produce their effects upon the system at large. It is of course of the greatest importance to ascertain to what defect in the system the loss of tone is due; whether to poorness of blood, to weakness of the heart, to defective digestion or excretion, or to enfeeblement of the nervous system generally. Otherwise the measures employed, while suitable in one of these conditions, may be very harmful if used in another. Amongst the chief medicines of this class are the dilute hydrochloric, nitric, nitro-hydrochloric, and phosphoric acids, various salts of iron, silver, and zinc, the various kinds of cinchona bark, with their alkaloids and their salts, cusparia, calumba, cascarilla, chiretta, gentian, quassia, and taraxacum, and generally most vegetable bitters. Although nux vomica and its alkaloid strychnine are placed by writers on Materia Medica amongst the 'special stimulants,' when given in very small doses they have a well-marked tonic action; and there is probably no tonic medicine of more general utility than the *Syrup of Phosphates of Iron, Quinine, and Strychnine* (Easton's Syrup), a non-officinal but widely-used preparation, of which every drachm (the ordinary dose) contains $\frac{1}{32}$ of a grain of strychnine.

Tonic Sol-fa. See SOL-FA SYSTEM.

Tonka Bean, the seed of *Dipteryx odorata*, a large tree, of the natural order Leguminosæ, suborder Papilionaceæ, a native of Guiana, having pinnated leaves and axillary racemes of purplish flowers. The fruit is an oblong, dry, fibrous pod, containing a single seed, which has a strong, agreeable odour, owing to the Coumarin (q.v.) which it contains, and which is sometimes found crystallised between the cotyledons. Tonka beans are used for flavouring snuff, and are put amongst clothes to preserve them from insects, and to communicate an agreeable odour. They are also, by a natural confusion, often called Tonquin Beans.

Tonkin. See TONGKING.

Tonnage, in regard to ships, is a measure both of cubical capacity and of dead-weight carrying capability. The term, used by itself, may have reference severally to 'builders' old measurement' tonnage (B.O.M.), 'register' tonnage, 'displacement' tonnage, 'freight' tonnage, &c., each of which expressions is more or less current in shipping circles. From very early times in the history of shipping a scale of one sort or other must have been employed to determine the relative capacity or carrying power of different vessels, and in point of fact the term 'tonnage' in this connection can be traced back for at least 500 years. In Britain the first act of parliament dealing with the subject was passed in 1422, a second was introduced in 1694, and a third in 1720, but the application of these was limited to particular classes of ships, or those employed in particular trades.

The first legal system of measurement having general application to all classes of merchant-ships was introduced in 1773, and is known as 'builders' old measurement.' Long before its legal enforcement, however, it, or a similar rule, had become the established practice of British shipbuilders, although not applied in an exactly uniform manner by different builders. Shortly stated, the rule was to multiply the length (minus three-fifths of the breadth) by the breadth, the product by half the breadth, and to divide by 94, the quotient expressing the tonnage. During the long period prior to the 19th century, when naval architecture made little progress, and types of ships and methods of construction were almost stereotyped, this system seems to have quite answered its original purpose—i.e. that of roughly expressing the 'dead-weight' carrying power of ships. But with the growth of shipping, and with the legal assessment of dues according to the tonnage as computed by this system, various methods of evasion were resorted to, the effects of which were most hurtful to true progress in ship architecture. The rule only concerned itself with length and breadth, and took no account of actual form or of depth, but assumed the depth to be equal to half the breadth. Builders had simply to increase the depth, leaving the length and breadth unchanged, or to make the form 'fuller,' in order to increase the carrying power without in any way increasing the legal and taxable tonnage. Ships were in consequence built with little beam and of such excessive depth as to render them unsafe and unseaworthy. The inadequacy and perniciousness of this system of measurement were only slowly recognised, and it remained in force until 1836, when a 'new measurement' law was substituted. For purposes of convenience, however, it continued to be used by builders in estimates as to cost and comparison of shipping, and even yet it is sometimes to be met with in builders' statements.

The 'new measurement' gave place in 1854 to 'register' tonnage, a system resembling it in principle, but much more perfect in its details, and which, with minor modifications, is still in force as the legal basis of measurement upon which dock, harbour, light, and other dues are assessed. It determines, in an accurate and easy manner, the entire internal capacity in cubic feet of a ship below the 'tonnage deck.' At suitably placed and equi-distant stations throughout the length of ship measurements are taken of the vertical transverse area of the hold, and these areas are used, in conjunction with the length of ship, in obtaining the volume of hold space. If a vessel's hull is continued unbroken to support a deck above the tonnage-deck, the volume of the space between the deck is separately estimated, and all closed-in spaces above the upper deck, such as poop, forecastle,

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deck-houses, &c., intended for accommodation or stowage, are also calculated. The sum of all these volumes in cubic feet, divided by 100, gives the 'gross register' tonnage. A 'register' ton, therefore, is simply 100 cubic feet of space, and has only very indirect relation to a 'dead-weight' ton of 20 cwt. avoirdupois. What is known as 'nett register' tonnage—and actually forms the tonnage inscribed in the register of British shipping—is the figure remaining after certain deductions are made from the gross. It is intended to represent the space actually available in a ship for remunerative service, such as the stowage of cargo or the accommodation of passengers. In sailing-vessels the deduction is very small indeed, representing the space occupied by the crew, and usually only from 4 to 5 per cent. of the gross. In steamers the case is very different, for not only the crew-space, but that occupied by the engines, boilers, coals, &c. is deducted. Details as to the method of computing these deductions cannot be given here, but it may be stated generally that for the majority of ocean-going steamers the nett tonnage is reduced from the gross by as much as about 35 per cent. The question of deductions has all along presented many difficulties and anomalies, and in some cases the original law has had to be amended to obviate these. On the whole, however, the principle on which the present system of tonnage measurement is based has served the purpose admirably—certainly in a way much superior to any previous system—and during the years it has been in vogue comparatively few changes have had to be made, while, on the other hand, it has been adopted by all the principal maritime nations and by various international commissions. Alternative systems of tonnage measurement have been advocated from time to time when existing inequalities have been found to press specially hard, but none have found entire favour. One is the substitution of a dead-weight basis of measurement, on the grounds that internal capacity in the present conditions of the shipping trade is not the fair measure of the possible earnings of ships under most circumstances, while dead-weight capability is, and that such a mode of measurement would obviate all disputes and difficulties as to deductions and allowances. Both this proposal and a somewhat similar one, based on a vessel's 'displacement'—i.e. the total weight of a ship in tons when immersed to her maximum draught or load-line—have the great disadvantage of necessitating the fixing of an equitable maximum load-line for the various classes of vessels, and for the vessels of the several maritime nations. The fixing of a universal load-line in the case of cargo-vessels is a problem fraught with almost insuperable difficulty, although a partial solution has been attained in connection with certain types of British merchant-ships.

'Displacement' tonnage is by general consent regarded as the fairest measure for the tonnage of naval ships, since they are designed to carry certain maximum weights and to float at certain load-lines which are fixed with reference to the character of service. It has for many years been the official tonnage for the warships of France and other European nations, and since 1872—prior to which date the B.O.M. rule was the only one employed—the tonnage of British naval ships has been based on the displacement principle. The United States navy has also adopted displacement tonnage; in fact, it is all but universally employed.

'Freight' tonnage, a system of measurement commonly employed in connection with stowage by merchants and shipowners, although it has no legal authority, is simply a measure of cubical capacity. A freight ton, or 'unit of measurement cargo,' simply means 40 cubic feet of space available for cargo, and is therefore two-fifths of a register ton. It is a purely arbitrary measure, based on the assumption that 40 cubic feet are required to stow a ton weight, but for some kinds of cargo of a lighter nature 45 and even 50 cubic feet form the unit of measurement.

In connection with yachts tonnage is measured by special rules for the purpose of regulating time allowances in racing. These rules are numerous and varied almost as the yacht clubs and associations employing them, but the rule which has hitherto been most generally adopted in Britain is known as the 'Thames Rule,' and is simply a slight modification from the B.O.M. tonnage.

Tonnage and Poundage, certain duties on wine and other merchandise, which began to be levied in England in the reign of Edward II. They were at first granted to the crown by the vote of parliament for a limited number of years, and renewed on their expiry. The object of these imposts was said to be that the king might have ready money in case of a sudden emergency demanding it for the defence of the realm and the guarding of the sea. Originally fluctuating in amount, tonnage (more correctly *tunnage*) and poundage came to be fixed at 3s. on every tun of wine, and 5 per cent. on all goods imported. In the reign of Henry V. they were first conferred on the king for life; and the same course being followed with his successors, the sovereign began gradually to consider them as his proper right and inheritance, and the vote of parliament as but a formality expressive of the popular recognition of his prerogative. Though these duties were not voted to Henry VIII. until the 6th year of his reign, he, notwithstanding, levied them from the date of his accession. It was, in fact, usual to levy these duties during the period intervening between a sovereign's accession and his first parliament, and this was done by Charles I., as by his predecessors. The Commons, however, in Charles's first parliament accorded these imposts not for life, but for a year only; and the House of Lords objecting to this departure from previous usages, and rejecting the bill, it was attempted to levy tonnage and poundage by the royal authority alone, a proceeding which repeatedly roused the opposition of the Commons. Charles was in 1641 induced to renounce the power of levying these or any other imposts without parliamentary sanction. Charles II. and James II. obtained grants of tonnage and poundage for life, but William III. only for limited periods; and by three statutes of Anne and George I. these imposts were made perpetual, and mortgaged for the public debt. The Customs Consolidation Act in 1787 swept away tonnage and poundage, and similar charges, and substituted a new and single duty on each article. See CUSTOMS DUTIES.

Tonquin. See TONGKING.

Tönsberg, one of the oldest of Norwegian cities and seaports, 71 miles SW. of Christiania by rail, has a large mercantile marine—some 140 ships, including whalers, and a pop. of 4913.

Tonsils. See PALATE.—Tonsilitis (or *Tonsillitis*) is inflammation of the tonsils, a form of sore throat varying much in intensity; see THROAT.

Tonson, a family of London booksellers in the first half of the 18th century. Its founder, Jacob Tonson, the son of a barber-surgeon, was born in 1656, apprenticed in 1670, and commenced business early in 1678 with a capital of £100. Before 1679 he published some plays of Otway and Tate, and as early as 1681 he had secured the patronage of Dryden. In 1700 he published Dryden's *Fables*.

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and soon after bought a country-house near the village of Barnes, where as secretary he entertained for many years the members of the famous Kit-Cat Club (q.v.). Tonson was also the first to open Shakespeare to the reading public by producing Rowe's octavo edition in 1709. After 1706 he published some of Pope's works. Tonson had his brother in partnership, and afterwards his nephew, and on his death at Ledbury, April 2, 1736, was succeeded by his grand-nephew, Jacob Tonson the third, who died in 1767. See Charles Knight's *Shadows of the Old Booksellers* (1865).

Tonsure (Lat. *tonsura*), a religious observance of the Roman Catholic and Oriental churches, which consists in shaving or cutting part of the hair of the head as a sign of the dedication of the person to the special service of God, and commonly to the public ministry of religion. By some writers it is represented as of apostolic origin (cf. Acts, xxi. 24); but that it did not prevail in the early ages is sufficiently plain. It would appear that the usage first arose in reference to the monastic rather than the clerical life. Paulinus of Nola, in the end of the 4th or beginning of the 5th century, alludes to it as then in use among the western monks; and it speedily passed from them to the clergy, the crown-like figure being regarded partly as a symbol of our Lord's crown of thorns, partly as an emblem of the 'Royal Priesthood' of the Christian dispensation. The form of the tonsure was different in different churches, and the varieties of it are of some historical interest. That of the Roman Church, called 'the tonsure of Peter,' consisted in shaving the crown as well as the back of the head, so that there remained a circular ring or 'crown' of hair. This was the form in use in Italy, Gaul, and Spain. In the 'Scottish (or Irish) tonsure,' which was in use in Ireland, in North Britain, and in those parts of Germany in which the Irish missionaries had preached, the entire front of the head was shaved, leaving the front bare as far back as the line from ear to ear. This tonsure was called 'the tonsure of James,' and by its enemies that of 'Simon the Magician.' The Greeks and other Orientals shaved *the entire head*. The supposed derivation of the Irish form of tonsure from the apostolic times led to its being held both in Ireland and in Britain, as well as other churches of Irish foundation, to be of the most vital importance. It was in use in the parts of England converted by Scottish missionaries, and was the subject of a violent controversy decided at Whitby in 664 in favour of the Roman usage (which triumphed also in regard to Easter and other peculiarities of the Celtic Church). The tonsure of some monastic orders and friars still leaves but a circle of hair: but the tonsure of secular clergy is quite small. The right to tonsure is with bishops, mitred abbots, cardinal priests, and certain priests with special privilege. Originally the tonsure was merely a part of the ceremonial of initiation in orders, and was only performed in the act of administering the higher order; but about the 7th century it came to be used as a distinct and independent ceremonial; tonsure is not an 'order,' but only a 'preparation for orders.'

Tontine, a term derived from the name of Lorenzo Tonti, a Neapolitan, who settled in Paris in Cardinal Mazarin's time, and proposed in 1653 to raise a fund of twenty-five million livres for the relief of the national exchequer by means of a financial association, of which the great prize should ultimately accrue to the longest liver. There were to be shares of 300 livres. The subscribers were to be divided into ten classes according to age; and for each class a fixed sum was annually to be divided equally amongst the members of the class. In this way, while each member should get fair interest from the first on his capital, the profit falling to survivors would increase as years went on, and the last survivor would receive the whole of the interest due to the class he belonged to. Mazarin and Tonti were both Italians, and regarded in Paris with suspicion, and, in spite of the cardinal's support, the scheme fell through. Tonti for a time received a pension, and was an active promoter of companies; but was ultimately committed to the Bastille, whence he for some years corresponded with his friends. There he seems to have died. But in 1689–92 Louis XIV., sorely in need of money, reverted to the plan of the Italian adventurer, and raised a sum of fourteen million livres by a tontine of forty years' duration. The sole survivor was in 1726 drawing an annuity of 73,500 livres on his original share of 300 livres. The tontine is a lottery of annuities—or compound of lottery and annuity—and was frequently had recourse to in France in the 18th century, with government sanction. Generally, in an association on what is called the tontine principle, a payment is made by each member of the association, and with the capital so formed an annuity, payable at the same rate until all the lives forming the association are extinct, is bought from some company or individual. This annuity is divided among the members according to age and premium paid by each; and on the decease of any member the surplus thence arising is divided among the survivors, and on the death of the last member of the association the total annuity reverts to the source from which it has hitherto emanated. There are various kinds of tontines; and the designation of tontine may, with propriety, be applied to any financial scheme by which it is proposed that gain shall accrue to survivorship.

In Britain tontines have been less popular than in France, but both in England and Ireland these were often established. Three Irish tontines in 1773–77 had 3500 members. The last public one in England was in 1789. In Great Britain they were chiefly set on foot not for purposes of public finance, but to enable a number of small capitalists to build hotels and the like, requiring sums beyond what any one of them singly could raise. Such a tontine was founded at Peebles in 1807; 144 members subscribed £25 each, and risked his share not on his own life, but on any life he chose to name—usually a healthy young child. The persons so named had diminished from 144 to 53 by 1864, and to 11 in 1880; in 1887 the shareholders, reduced by death to two, sold their shares for £2130. In 1871 it was proposed to organise a tontine to take over the Alexandra Park and Palace, but the scheme came to nothing. The United States has had its tontines also: the New York Tontine Association, founded in 1790, was wound up in the years 1870–78. See articles in *All the Year Round* (February 1873) and *Chambers's Journal* (March 1880).

We occasionally hear of Tontine Clubs where the original members have the advantage that the last 100 survivors of their number become proprietors of the Club. The system is a feature of many American insurance societies (see INSURANCE).

Tooke, JOHN HORNE, was born 25th June 1736, in Newport Street, Westminster, the third son of John Horne, a well-to-do poulterer. He was educated chiefly at Westminster and Eton (where a schoolfellow's pen-knife destroyed the sight of one eye), and then at St John's College, Cambridge. Taking his B.A. in 1758, he entered at the Middle Temple, and for a time was an usher at Blackheath, but in 1760, to please his father, accepted the living of New Brentford. He had neither liking nor reverence for the clerical

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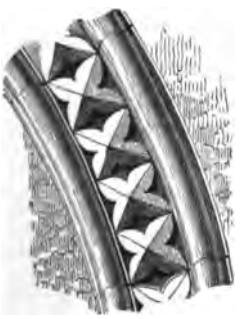
profession, and dropped it during two travelling tutorships (1763–65); at Paris he met John Wilkes, and conceived the strongest admiration for him. When in 1768 Wilkes stood for Middlesex 'Parson Horne' pledged his credit for his expenses, and vowed that 'in a cause so just and holy he could dye his black coat red;' but ere long they fell out, and in 1771 had a rasping epistolary controversy. Horne, however, who in 1770 had composed the famous (unspoken) speech of Lord Mayor Beckford to the king, still continued to meddle in politics, and even encountered, not without success, the formidable 'Junius.' In 1773 he resigned his living, and resumed the study of law. About this time his spirited opposition to an enclosure bill procured him the favour (*plus* £8000) of the rich Mr Tooke of Purley in Surrey; and to this were due both his assumption in 1782 of the surname Tooke and the sub-title of his *Epea Pteroenta, or the Diversions of Purley* (2 parts, 1786–1805), that witty medley of etymology, grammar, metaphysics, and politics, which he commenced during an imprisonment in the King's Bench for promoting a subscription for the Americans 'barbarously murdered at Lexington by the king's soldiers in 1775.' In 1779 he found himself debarred from the bar by his orders; in 1790, and again in 1797, stood unsuccessfully for Westminster; in 1794 was tried for high-treason, but acquitted; and in 1801 obtained a seat for the rotten borough of Old Sarum, only, however, to be excluded by a special act from the next parliament (see CLERGY). He died at Wimbledon, his home for the last twenty years, on 18th March 1812, bequeathing his property to his natural children.

See the Life by A. Stephens (2 vols. 1813), and Thorold Rogers' *Historical Gleanings* 2d series, 1870).

Toole, JOHN LAWRENCE, the most popular low-comedian of his day, was born in London on 12th March 1832. Originally intended for city life, he soon gave up the desk and became an actor. He first played at Ipswich, then served an apprenticeship in the provinces, making a great reputation for himself in Edinburgh, Glasgow, and Dublin. He made his first appearance in London at the St James's Theatre in 1854, and played afterwards at the Lyceum with Charles Dillon, at the Adelphi under the management of Benjamin Webster, and at the ill-fated Queen's Theatre in Long Acre. In 1874–75 he played in the United States, and in 1890 in Australia. In 1879 he became lessee of the Folly Theatre, which he enlarged, changing the name to 'Toole's Theatre.' See his *Reminiscences*, chronicled by Joseph Hatton (1888).

Tooley Street, a street in Southwark, at the foot of London Bridge, derives its name from a corruption of St Olave, a church here, and is famous through Canning's story of its three tailors who began their petition to parliament with 'We, the people of England.'



Tooth-ornament.

Toombudra (correctly, TUNGABHADRA), an important tributary of the Kistnah or Krishna, rises in the south-west of Mysore, and after a north-east course of 400 miles joins the Kistnah 16 miles below Karnul.

Toothache. See TEETH, DENTISTRY.

Tooth-ornament, a form of sculptured enrichment much used in the Early English style.

Topaz, a mineral, ranked by mineralogists amongst Gems (q.v.), and the finer varieties of which are much valued both for their lustre and the beauty of their colours. It is composed chiefly of alumina and silica, the former, in general, more than 30 per cent. of the whole, with fluoric acid, and usually a little oxide of iron. It is found generally in primitive rocks, and in many parts of the world—Russia, Siberia, Saxony, Australia, the United States, Cornwall, Aberdeenshire, the Mourne Mountains in Ireland—but those most prized by jewellers are generally from Brazil. Topaz may be colourless, light blue or green, rose-pink, orange, or straw yellow, in great variety of shades. Its crystals are rhombic prisms, generally terminated by four-sided pyramids, but often variously bevelled and acuminated. The prisms are finely striated. The specific gravity is about 3·5. Topaz is translucent or almost transparent on the edges, and is harder than quartz. It is rendered very electric by heat or friction, and by this property a topaz may at once be distinguished from a diamond or ruby, for which otherwise, when cut and set, it might readily be mistaken. A coarse variety of topaz called *Pyrophysalite* occurs near Fahlun in Sweden, which is not crystallised; when reduced to powder it can be used as emery for grinding and polishing. The so-called 'oriental topaz' is a yellow corundum; the 'false topaz' is a yellow variety of vitreous quartz. Topaz derives its name from the *Topazion* of the ancients, which, however, seems to have been a totally different mineral, probably chrysolite.

Tooth Powder. See TEETH, p. 98.

Toothwort, a name for *Lathræa squamaria*, one of the Insectivorous Plants (q.v.); as well as for *Dentaria bulbifera*, one of the Cruciferæ (q.v.) common in England, also known as 'coral-wort' and 'tooth-violet.'

Tope (*Galeus canis*), a small species of shark abundant on the southern coasts of Britain, more rare towards the north. Its range extends to

Tope (*Galeus canis*).

Tasmania and California. The name tope is said to be originally Cornish; other local names are *Miller's Dog* and *Penny Dog*. The fish attains a length of about 6 feet; its colouring is dark gray above, white below. Numerous young—a score or more—are born viviparously at a birth. In France and Italy the tope is sometimes eaten either fresh or after drying; the liver is also used for oil. The tope is extremely troublesome to fishermen, robbing their lines of the fish which are attached to them, and biting off the hooks, or, if it happens to be itself hooked, often winding the line round its body in many coils and with tangled knots.

Tope (Pali *thûpo;* Sansk. *stûpa*, 'a mound'), a Buddhist tumulus for the preservation of relics, of more or less solid masonry, in which the relics were deposited. The oldest topes are spherical; others have polygonal bases; and they were originally crowned with an umbrella-shaped finial, and surrounded by a carved stone railing with elaborately carved gateway. The chief one of a great group at Sanchi near Bhilsa (q.v.) in Central

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India, is 42 feet high and 106 feet in diameter. In Ceylon they are called dagobas; there is an illustration of one in the article CEYLON. Some topes are rock-cut. See also INDIA, Vol. VI. p. 108.

Topee. See TANTIA TOPEE.

Tope'ka, the capital of Kansas, is on both banks of the Kansas River, 67 miles W. of Kansas City by four great railways. It is well built, with wide, shady streets, and possesses a handsome capitol building, a Congregational college, a Roman Catholic seminary, and an Episcopal ladies' college; while close by are the state asylum for the insane and the reform school. Topeka is the seat of an Episcopal bishop. It has nearly a dozen flour-mills, large railway-shops, several foundries and packing-houses, and manufactories of carriages, pottery, bricks, biscuits, starch, vinegar, tents, windmills, &c. Founded in 1854, it became the state capital in 1861. Pop. (1880) 15,452; (1890) 31,007.

Topelius, ZACHRIS (born 1814), Swedish-Finnish poet. See SWEDEN, p. 10.

Töpffer, RUDOLF, artist and novelist, was born the son of a painter at Geneva, January 31, 1799, and himself studied art, but was obliged by the weakness of his eyes to become a teacher. He founded a boarding-school in 1825, and conducted it till his death, was named in 1832 professor of Rhetoric at the Geneva Academy, and died 8th June 1846. His name is widely known from the delightful *Nouvelles Genévoises* (1841), and from the exquisite little masterpiece of sentiment and fancy, *La Bibliothèque de mon Oncle* (1832). Other novels are *Le Presbytère* (1833) and his last and unfinished work, *Rosa et Gertrude* (1846). Töpffer had a genius for humorous caricature, and the drawings in his two series of *Voyages en Zig-zag* (1843–53) are almost better than the text.

See the Lives by Relave (1886), and Blondel and Mirabaud (1887); also Rambert, *Écrivains nationaux Suisses* (vol. i. Geneva, 1874). See Sainte-Beuve, *Portraits Littéraires*, vol. iii., and *Portr. Contemporains*, vol. iii.

Tophané, a suburb of Constantinople (q.v.).

Tophet. See GEHENNA.

Topknot, the popular name of some small fishes of the same genus as the Turbot (q.v.) and brill. A typical representative is *Rhombus punctatus*, a fish about 6 inches in length and 4 in breadth. It occurs on British and other northern European coasts, living among rocks and seaweed, with which the brown colour spotted with black harmonises well.

Toplady, AUGUSTUS MONTAGUE, hymn-writer, was born at Farnham in Surrey, November 4, 1740, and had his education at Westminster and Trinity College, Dublin. He had been awakened at fifteen in an Irish barn, but it was three years more before he had 'a full and clear view of the doctrines of grace.' He took orders in 1762, and became vicar of Broad Hembury, Devonshire, in 1768. During the last three years of his life he preached in a chapel near Leicester Fields in London; and here he died, August 11, 1778. A strenuous defender of Calvinism, he was a bitter controversialist, and is not sparing in terms of abuse, even of Wesley himself. His work, *The Church of England vindicated from the Charge of Arminianism* (2 vols. 1774), is safely forgotten, as it deserves to be; but his name survives secure of immortality in a hymn like 'Rock of Ages.' As early as 1759 he had published at Dublin *Poems on Sacred Subjects;* his *Psalms and Hymns* (1776) was a collection, with but few of his own. The best edition of his whole verse is that by D. Sedgwick (1860); of his entire works collections were published in six vols. in 1794 and in 1825. See Bishop Ryle's *Christian Leaders of a Hundred Years Ago* (1869).

Töplitz. See TEPLITZ.

Top-shell. See TROCHIDÆ.

Torbanehill. See BOGHEAD COAL.

Torfæus. See ICELAND (LITERATURE).

Torgau, a town of Prussia, and a fortress of the second rank, stands on the left bank of the Elbe, 70 miles SSW. of Berlin by rail. The river is here crossed by an old bridge and a railway bridge. Among the public buildings are the castle, now used as barracks, and containing a church consecrated by Luther in 1544; a town-church, with pictures by Cranach, and the grave of Luther's wife; and an old town-hall. Here on 3d November 1760 Frederick the Great defeated the Austrians. Pop. 10,988.

Tormentil (*Potentilla*), a genus of plants of the natural order Rosaceæ, sub-order Potentilleæ, differing from other species of Potentilla (q.v.) only in the four-parted calyx and corolla. The Common Tormentil (*Tormentilla officinalis*, or *P. tormentilla*) is a very common plant in moorish and heathy places in Britain and throughout great part of Europe. It has a large woody root, which has long been officinal, being an agreeable and efficacious astringent, useful in diarrhœa and other complaints, and which contains tannin, gum, and a red colouring matter.

Tormentil (*Potentilla tormentilla*).

Tornado. See STORMS, WHIRLWIND.

Tornea, a town in the Finnish government of Uleåborg, at the mouth of the Tornea River, which, rising in the Tornea lake, forms during great part of its course of 250 miles the boundary between Sweden and Finland. Pop. 1015; across the river is the Swedish town of Haparanda.

Toro, a town of Spain, on the right bank of the Douro, 20 m. E. of Zamora by rail. Pop. 8722.

Torontál, the Hungarian county on the Maros and Theiss, with Becskerek (q.v.) for capital.

Toronto, second in importance among the cities of Canada. As Montreal is the metropolis of the east and of so much of the west as its great railway facilities enable it to control for business purposes, so Toronto aims to be the metropolis of the west, including the newly-opened regions of the North-west.

The name is derived from the Huron word signifying 'place of meeting.' In 1749 the French established a chain of posts or forts through all the west and down the Mississippi Valley, and two forts, one at Kingston, Fort Frontenac, and one at Toronto, called Fort Rouillé. In 1756 this fort, on the west side of the present city, was destroyed to prevent its falling into the hands of the English. In 1793 Governor Simcoe finding Niagara or Newark too close to the

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American side—indeed, right under the guns of an American fort—for the seat of government, crossed Lake Ontario and established his headquarters in a tent on a site to the east of the present city. In this tent he passed a whole winter before a government house could be erected for his use. In 1812 Toronto, called York by Governor Simcoe, was captured and burned and looted twice in the same year by the American army and navy. In 1834 it was incorporated as a city with its present name Toronto. In 1837 it was the scene of a brief and ineffectual rebellion under Lyon Mackenzie (q.v.). Since that time its history has been purely civic, without other interest than that attaching to prosperous growth. The growth of population has been rapid. In 1793, when Governor Simcoe landed, there were only two Indian families. In 1834 the population was less than 10,000. In 1861 it had increased to 44,821, in 1871 to 56,092, and in 1881 to 86,415. In 1891, including some annexed suburbs, it amounted to 181,220.

The city is the capital of the province, and all the departments of the provincial government are centred in Toronto. The lieutenant-governor resides there, and the official residence is a handsome building. The local legislature meets annually in the building prepared for the earlier legislature of a united Canada (before 1840). The Dominion government has also great establishments in Toronto in the custom-house, post-office, internal revenue offices, and a meteorological observatory. The law-courts are centred in Osgoode Hall, a very stately and roomy building.

The principal ecclesiastical buildings are the cathedral of St James (Anglican), the Metropolitan Methodist Church, and St Michael's Cathedral (Catholic). In educational institutions Toronto is very rich. The university of Toronto, which was burned to the ground in 1890, was a very imposing structure, and will when again erected be worthy of its noble site and splendid grounds. The professorial staff numbers about 21, and the number of students in attendance averages 400. There are also Trinity College (Anglican), Wycliff College (Protestant), Knox College (Presbyterian), Macmaster Hall (Baptist), St Michael's College (Catholic), besides the Normal School, Collegiate Institute, endless public schools and separate (Catholic) schools and convents; and there is a School of Practical Science. Toronto has a Public Library (1884) which now contains about 40,000 volumes; the University Library, destroyed in the fire of 1890, but gradually gathering up again; the Law Library (20,000 volumes); the library of the Canadian Institute; and the Legislature Library, which has about 30,000 volumes. Each of the colleges has a select library for its own purposes.

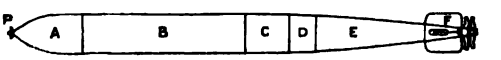
The commerce of Toronto has grown with the growth of the city. In 1870 the total imports of the city amounted to $7,126,953; the exports were $1,067,268. In 1890 the imports amounted to $20,519,797, and the exports to $2,945,390. The lake commerce is also very large in lumber, fruit, grain, coal, and cattle. The lake shipping entering Toronto in 1890 amounted to 303,571 tons; those vessels run only during the season, and connect the city with railway lines east, west, and south. The Grand Trunk and Canadian Pacific Railway, which have amalgamated the smaller lines, afford every facility for the business of the community.

In the year ending 30th December 1890 the total receipts from civic taxes amounted to $2,242,951; total expenditure on public and separate schools, $547,391; disbursements of all kinds, $1,198,896. The net debenture debt of the city amounts to $12,769,508. In 1890 the supply of water amounted to 5,249,760,226 gallons; the average daily consumption was 14,434,722 gallons.

Torpedo, a genus of cartilaginous fishes of the family Torpedinidæ, related to the skates and rays. They are most remarkable for their electric organs, which lie on each side of the head (see ELECTRIC FISHES, with illustrations). The electric shock is powerful enough to kill small animals, and specimens 2 or 3 feet wide can by a single discharge disable a full-grown man. The genus, which includes about six species, is widely distributed over the Atlantic and Indian Oceans; *T. marmorata* and two others are common in the Mediterranean, and *T. hebetans* reaches the south coasts of Britain.

Torpedo. The term torpedo is now used to denote a submarine weapon of offence, carrying a charge of gun-cotton or other explosive, and possessing powers of locomotion, in distinction to a submarine mine (see MINES), which is stationary and used for defensive purposes. Torpedoes may be divided into two classes: (1) *Uncontrollable*, being those which carry within themselves their own motive power, and which after being once started are no longer under the control of the operator; and (2) *Controllable*—i.e. those whose motive power is under the control of the operator, who can by electricity or other means direct the movements of the torpedo during its run. Of the first the best-known examples are the Whitehead and the Howell; and of the second the Brennan, Sims-Edison, and Lay. Of these the most important is the Whitehead, which dates from about 1867.

The general arrangement of this weapon is shown in the figure: it is cigar-shaped, made of steel or bronze, and varying from 12 to 18 inches in diameter, and from 10 to 16 feet 6 inches in length, the most common size being 14 inches in diameter and 14 feet 6 inches long. The head A is conical and contains the charge of gun-cotton, which in the 14-inch torpedo varies from 32 lb. in the earlier patterns to 70 lb. in the later ones. The pistol, P,



on coming in contact with the enemy's ship is driven back on to a small charge of fulminate of mercury which detonates the gun-cotton. B is the air-chamber which contains the compressed air for driving the engines. The air is forced into this chamber by means of air-pumps to a pressure of ninety atmospheres. C is the balance chamber, and contains the mechanism by which the depth of the torpedo below the surface is regulated during its run. The depth of the torpedo can be adjusted before starting to any required amount between 5 and 20 feet. In D are the engines worked by the compressed air. E is the buoyancy chamber. F is the tail, consisting of two screws placed one in front of the other for propelling the torpedo, two small vertical rudders which are adjusted by experiment to keep the torpedo running in a straight line, the horizontal rudders which are controlled by the mechanism in the balance chamber and which keep the torpedo at the depth for which it has been set, and four fins, two horizontal and two vertical, to prevent rolling.

The torpedo is discharged from a tube either above water or below the water-line. In the latter case special arrangements are made. In above-water tubes the torpedo fits the tube like a projectile in a gun, and is ejected either by a small charge of powder or by compressed air. As the torpedo leaves the tube the valve controlling the supply of air to the engines is opened, and the torpedo on entering the water is propelled by its

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own engines. A safety arrangement on the pistol prevents the latter exploding the charge by accident until the torpedo is clear of the ship. The speed of the later patterns of 14-inch torpedoes is 26 knots for 600 yards. In action it can be adjusted to sink at the end of its run in the event of its missing its object, and when used for exercise it is adjusted to float, and can then be picked up and used again. For various reasons it is considered that the effective range of a Whitehead torpedo is not more than 400 yards, and although the torpedo is capable of going much farther, it is desirable, in order to ensure a fair measure of success, not to discharge the torpedo until within that distance of the enemy.

The position which the Whitehead torpedo is destined eventually to take in naval warfare is to a great extent a matter of speculation. There have been instances in recent wars where it has been used with success even with the inferior weapons and apparatus then in use. On the other hand, torpedoes occasionally take most erratic courses, and no one can predict with certainty what direction one will take. Moreover, in consequence of the slow speed of a torpedo as compared with a projectile, and also on account of the deflection it receives on entering the water, it is necessary in discharging it to take into consideration the speed of one's own ship and also the speed and course of the enemy; and as the two latter must necessarily be more or less guess-work, an additional element of error is introduced. Another objection, the importance of which can only be determined in war time, is that during the time the torpedo is waiting to be discharged the charge is liable to be detonated by an enemy's shot, the results of such an accident being obviously of a most disastrous character. The torpedo is, however, at present recognised as a most important element in naval warfare, and its use must of necessity be continued until war has decided definitely in its favour or otherwise. Recently a very much more powerful type of Whitehead has been introduced, 18 inches in diameter, carrying a charge of about 200 lb. of gun-cotton, and having a speed of about 30 knots for 800 yards.

The *Howell torpedo*, though only in the experimental stage, gives great promise. In shape it is similar to the Whitehead, and is propelled by screws to which motion is imparted by means of a heavy flywheel in the interior of the torpedo which is spun up to 10,000 revolutions a minute, before discharging, by means of suitable machinery. This wheel, in addition to providing the requisite energy, also acts as a gyroscope, the result of which is that the torpedo continues to run in the direction of the line of fire, and cannot be deflected from its course. The application of the gyroscopic principle to torpedoes is new and ingenious, and its development will be watched with interest. The charge is exploded on contact.

The *Brennan torpedo* carries inside it two drums on which are wound piano wire which, passing out of the rear of the torpedo, is connected with powerful engines on shore. On these being started the wire is reeled off the drums in the torpedo, the motion of the drums being imparted to the screws. The faster the wire is reeled up on shore, the faster will the torpedo go ahead. Steering is effected by checking one or other of the wires which actuate vertical rudders on the torpedo. The charge is exploded on contact, and the range is a mile or more.

The *Sims-Edison torpedo* consists of a 'float' to which is suspended the torpedo so that it is about 6 feet below the surface. The motive power is supplied by an electric motor in the torpedo worked from a generator at the base through an electric cable which is paid out as the torpedo advances. The *Lay torpedo* is propelled by carbonic acid gas contained in the torpedo under pressure, the engines being controlled by the operator through an electric cable. The charge in both these torpedoes is exploded by electricity at will, and the speed in each is about 10 or 11 knots for one mile.

The three last torpedoes are connected to the base from which they start, by means of wires, and it would be a matter of very great difficulty to control these torpedoes, and to direct their course so as to strike any particular object, if they were used from a moving base. Hence any proposals to use them on board ship have not so far met with much favour, and it is unlikely that this class of torpedo will ever be used except from forts or fixed stations on shore.

The *Outrigger torpedo* is used from steam pinnaces, and consists of a charge of gun-cotton placed at the end of a pole about 40 feet long, which projects over the bows of the boat, the charge being about 10 feet below the surface when in position. The boat in making an attack has to bring the charge in contact with the bottom of the enemy's ship, and it is then exploded by electricity. A notable instance of the success of this method of attack occurred during the American civil war; but under present conditions an attack on a modern ship with the outrigged torpedo must be regarded as impracticable except under very exceptional circumstances.

Torpedo Boats.—If a large ship is to be attacked by a comparatively small boat, the latter, in order to have any chance of success, must be as nearly invisible as possible, and must possess a high speed. Torpedo boats designed to fulfil these requirements vary considerably in size, but may be broadly divided into two classes—those which can be carried on board large ships, and which are therefore limited in size and possess small sea-going powers; and those which can take the sea and act independently. The two classes are similar in construction, being built of the lightest steel, low in the water, and with most of the available space occupied by the engines and apparatus connected with the torpedoes. The former class are about 60 feet in length, 15 knots speed, and carry a crew of eight men. The latter range from 100 to 150 feet in length, have a nominal speed of from 19 to 22 knots, which in practice rarely exceeds 17 to 20 knots, and carry a crew of from sixteen to twenty men, with three to five torpedoes, and also a small gun armament.

There is also an intermediate class of vessel, known as torpedo-boat catchers, carrying an armament of machine guns and torpedoes. These vessels are of high speed, and their superior size and sea-going qualities enable them to maintain their speed in the open sea far better than a torpedo boat, whilst their powerful armament would render them formidable opponents even to large ships.

For torpedo-nets, see NAVY, Vol. VII. p. 421. For part of the history of submarine warfare, see SUBMARINE NAVIGATION. See also Sleeman's *Torpedoes and Torpedo Warfare* (1880; 2d ed. 1889).

Torquay, a watering-place of South Devon, occupying a cove on the north side of Tor Bay, 23 miles S. of Exeter and 220 WSW. of London. Tor Abbey was founded here for Premonstratensian monks in 1196; and Tor Bay is famous in history as the place where in 1688 William of Orange landed at Brixham (q.v.), and during the war with France was often used as a naval rendezvous. But till the beginning of the 19th century Torquay itself was little more than an assemblage of fishermen's huts. About that time the advantages of its climate—which are a peculiarly sheltered position, an equable temperature (mean 44° in winter, 55° in summer), and freedom from fogs—caused it

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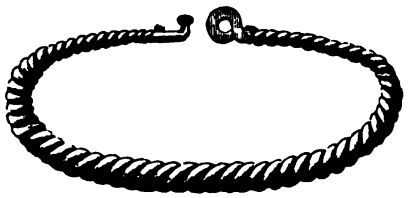
to be resorted to by consumptive patients, and it soon acquired a European celebrity, which still is almost unrivalled. The romantic hills and valleys of Torquay and its environs have been overspread with terraces, villas, and gardens, the luxuriance of its foliage being a delightful feature of this 'queen of English watering-places.' The scenery is as varied as it is beautiful, the geology of the district most interesting; and Kent's Cavern (q.v.) is only a mile distant. The remains of the abbey include some crypts and the 13th-century 'Spanish barn' (so called from its having housed some survivors from the Armada); and St Michael's Chapel, on a hill-top, is thought to have been connected with the abbey. St John's Church, by Street, is a striking Early English edifice; and other buildings are the town-hall (1852), museum (1875), and theatre (1880). Torquay is a great yachting station; its chief industries are the working up of Devonshire marbles and the manufacture of terra-cotta. Pop. (1851) 7903; (1881) 24,767; (1891) 25,534. See J. T. White's *History of Torquay* (1878).

Torque (Lat. *torqueo*, 'I twist'), a species of gold ornament, worn round the neck or arm, which was much in use in ancient times, both among Asiatic and north European nations. It consisted of a spirally-twisted bar of gold, bent



Torque.

round nearly into a circle, with the ends free, and terminating in hooks, or sometimes in serpents. These ornaments seem to have formed an important part of the wealth of those who wore them, and of the plunder obtained by the Roman conquerors from a Celtic or oriental army. Numerous examples have been dug up in Great Britain and Ireland, as well as in France.

Torquemada, THOMAS DE, the first inquisitor-general of Spain, was born at Valladolid in 1420, and died at Avila, 16th September 1498. He became prior of a Dominican monastery at Segovia, and succeeded in persuading Ferdinand and Isabella to crave from the pope the appointment of the 'Holy Office' of the Inquisition (q.v.). Torquemada was appointed its head, and began in 1483 that infamous work which has left his name a by-word for pitiless cruelty. He has given a subject to Longfellow and to Hugo.

Torre dell' Annunziata, a thriving town of Southern Italy, stands on the south base of Mount Vesuvius, 13 miles SE. of Naples by rail. A fishery and a coasting trade are carried on. Pop. 20,060.—TORRE DEL GRECO, another town at the base of Vesuvius, is only 7 miles from Naples by rail, and has been repeatedly destroyed by eruptions. Fishing is a great source of occupation, and coral is worked. Pop. 21,588.

Torrens, LAKE, sometimes a brackish lake, at others merely a vast salt-marsh, in South Australia. It lies 90 miles N. of Spencer's Gulf. Usual length, about 130 miles by 20 miles broad. It is named after Sir R. R. Torrens (1814–84), who between 1841 and 1874 held many important offices in the colony, and is best known for his Land Titles Registration Act.

Torre Pellice (Fr. *La Tour*), a Piedmontese village of 2900 inhabitants, 34 miles SW. of Turin by rail. It is the headquarters of the Waldenses (q.v.), with a college, and some manufactures of cotton-cloth and silk.

Torres Strait lies between the northernmost part of Australia and New Guinea. The channel is from 80 to 90 miles in width; and its navigation, though practicable, is rendered dangerous and difficult by the innumerable shoals, reefs, and islands with which it is strewn. It was discovered in 1606 by Luis Vaez de Torres, a Spanish navigator sent out by the viceroy of Peru. See map at NEW GUINEA, and *Nature*, October 1890, p. 637.

Torres-Vedras, a town of the Portuguese province of Estremadura, 26 miles N. of Lisbon by rail. It is known from those famous lines of defence within which Wellington defended himself the winter of 1810–11 against Masséna. There were three such lines of fortification; and the area within the lines was about 500 sq. m. Hence Wellington issued on that career of slow and hard-won victory which ended in the expulsion of the French from the Peninsula. Pop. 4926.

Torricelli, EVANGELISTA, mathematician and philosopher, was born at Piancaldoli in the Romagna, 15th October 1608. He was brought up by an uncle who resided at Faenza, and who put him under the tuition of the Jesuits. When twenty years old he was sent to Rome, and there devoted himself to mathematical studies. Galileo's theories on force and motion engaged his attention, and led to his writing a *Trattato del Moto* (about 1641), and to his being invited by Galileo (1641) to visit him; on the old philosopher's death, three months afterwards, he was appointed mathematician to the grand-duke, and professor to the Florentine Academy. Here he resided till his death, 25th October 1647. His great discovery was the interpretation of the previously known fact that water will rise in a suction-pump only to the height of about 32 feet—the idea that the column of fluid is sustained by the pressure of the atmosphere on the open surface of fluid (see BAROMETER). The vacuum in the barometer is the Torricellian vacuum; and the barometer is sometimes called the Torricellian tube. Torricelli also effected the quadrature of the cycloid—in this he was anticipated by Roberval—and made other mathematical discoveries. To him is due the fundamental principles of Hydromechanics (q.v., Vol. VI. p. 32); and he made and greatly improved both telescopes and microscopes.

Torrigiano, PIETRO (1470–1522), the Florentine sculptor who, according to Cellini, broke Michelangelo's nose in a quarrel, served as a mercenary soldier, and came to England in 1509 to erect the tomb of Henry VII. and his queen, still in Westminster. He executed other works which were destroyed at the Reformation; and settling in Spain, died in the prisons of the Inquisition.

Torrington, a market-town of North Devon, on an eminence sloping to the Torridge, 10 miles (by rail 14) SSW. of Barnstaple. A castle (1340) has disappeared; and the church, of which Wolsey and John Howe were incumbents, was rebuilt in 1651, its predecessor having been accidentally blown up with 200 prisoners, after Hopton's defeat here by Fairfax, February 16, 1646. Torrington, which was made a municipal borough by Queen Mary, gave the title of earl to Monk (q.v.) and in 1689 to Admiral Arthur Herbert (1647–1716), of viscount to Admiral George Byng (q.v.). Gloves are manufactured. Pop. (1851) 3308; (1891) 3436.

Torshok, an ancient town of Russia, in the government of Tver, 310 miles SE. of St Petersburg by rail. Pop. 14,574.

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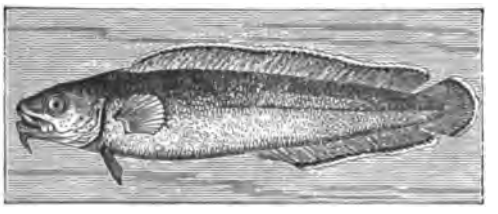
Torsion is the kind of strain produced in a bar or wire when one end is kept fixed and the other is rotated about the axis. The axis itself is in no way changed, but every other line originally parallel thereto takes the form of a helix or screw. The torsion is measured by the inclination of the diameter of any section to the diameter originally parallel to it of the section at unit distance. The moment of the forces which produce the torsion is called the torsional stress or *torque;* and the coefficient of torsion is the ratio of the stress to the strain. The coefficient of torsion depends on the Rigidity (q.v.) of the material and upon the size and form of the bar. For wires and bars of circular section the coefficient of torsion varies as the fourth power of the radius. That is, to produce the same torsion in two wires whose diameters are as 2 to 1, we must apply, in the case of the thicker wire, a torsional stress 16 times greater than that needed for the thinner wire. By the manufacture of excessively thin quartz fibres Professor Boys has obtained torsional coefficients of very minute magnitude.

Torsion-balance is a form of apparatus in which the torsion of a wire is used for the measurement of various kinds of forces. In this way Coulomb discovered the fundamental laws of electric and magnetic attraction (see ELECTRICITY) and Cavendish measured the density of the Earth (q.v.). By means of his quartz fibres Professor Boys has been able to reduce into a very small compass the whole apparatus for making the Cavendish experiment.

Torsion, in Surgery, is a method of common application for the purpose of checking arterial hæmorrhage in certain cases. The wounded vessel is drawn out and fixed by a pair of forceps a quarter of an inch from the end; the end of the artery is then twisted round till it will not untwist itself. It is especially useful when there are many small arteries wounded in an operation, as, for example, in the extirpation of a large tumour.

Torsk, or, by corruption, TUSK or CUSK (*Brosmius brosme*), a valuable fish of the cod family (Gadidæ), abundant in the northern parts of the Atlantic. It measures from 18 inches to 3 feet in length. The head is small, with one barbule under the chin; the single dorsal fin is long; the tail is rounded. The head is dusky, the back and sides yellow, passing into white on the belly. The torsk



Torsk (*Brosmius brosme*).

lives in deep water, but spawns very early in the year among the seaweed of rocky coasts. It is caught in the same manner as cod, ling, &c. Firm and tough when fresh, it is esteemed when dried and salted. It is occasionally caught in the Firth of Forth, but belongs to more northern regions, and is very abundant in the Shetland Isles, the Faroes, on some parts of the coast of Norway, and on the south and west coasts of Iceland. Another species (*B. flavescens*), with two barbules, occurs on the Newfoundland banks.

Torso (Ital.), strictly, signifies a trunk—e.g. the trunk of a tree—but is specially applied to a statue of which only the body remains.

Torstensson, LENNARD, Count of Ortala, a Swedish general, was born at Torstena on 17th August 1603. He accompanied Gustavus Adolphus to Germany in 1630, distinguished himself in the battles of his great master, and after his death fought under Bernhard of Saxe-Weimar and Banér, and in 1641 he was appointed to the supreme command of the Swedish army in Germany. He invaded Silesia, and, when driven back by the imperialists, turned and crushingly defeated them at Breitenfeld (2d November 1641). The next winter he hastened north, and in six weeks swept the Danes out of Holstein, and then drove the Austrians, who had thought to assail him in the rear, ignominiously back all the way to Bohemia. In 1645 he advanced to the walls of Vienna. He died at Stockholm on 7th April 1651.

Tort (Lat. *tortus*), in the law of England, includes all those wrongs, not arising out of contract, for which a remedy by compensation or damages is given in a court of law. Such are assault, false imprisonment (i.e. arrest or detention without legal justification), unlawful detention or conversion to one's own use of the goods of another, &c. Deceit also is a tort, if a person suffer damage by acting on an untrue statement made with the intention that he should act on it. The general rule of law was that the right of action for a tort died with the person who committed it; but this defect has been cured by statute to a certain extent. If the wrong was done within six months preceding the wrong-doer's death, an action may be brought against his executors within six months after they have assumed office. So if the injured party lived he could always bring an action of damages; but if he died his executors or relatives could not do so until Lord Campbell's Act enabled the wife, husband, parent, or child of such deceased injured party to sue for damages; and in such case the jury may apportion the damages between the widow and children who sue. The right to bring an action for a tort is limited to two, four, or six years respectively, according to the nature of the wrong. In Scotland there is no time limited for bringing the action. The law of the United States is founded on that of England.

See treatises on torts by Addison (1857; new ed. 1887), E. W. Ball (1884), M. M. Bigelow (3d ed. Boston, 1886), T. M. Cooley (2d ed. 1888), A. Underhill (5th ed. 1889), Clerk and Lindsell (1889), Sir F. Pollock (2d ed. 1890), and L. C. Innes (1891).

Tortoise-plant, a South African name for Elephant's Foot (q.v.).

Tortoises and **Turtles** (*Chelonia*) form a well-defined order of Reptiles, distinguished especially by the dorsal and ventral shields which protect the body. Although terrestrial Chelonians are often called tortoises, and aquatic Chelonians turtles, the distinction cannot be sustained. The dorsal shield or carapace, within shelter of which the head, limbs, and tail can be more or less completely sheltered, is formed (*a*) along the middle line by the vertebræ whose neural spines are flattened, (*b*) by expansions of the parts which in other animals form well-defined ribs, and (*c*) along the edge by marginal plates ossified in the under skin or dermis. The dorsal vertebræ and ribs are thus rigidly involved in the carapace; the neck and the tail are the only flexible parts. The ventral shield or plastron consists of nine bony pieces, one anterior and four on each side. They arise as membrane bones in the dermis. Overlapping, but not corresponding to the bones of the shields, are horny epidermic plates of 'tortoise-shell,' which although hard are not without sensitiveness, numerous nerves ending upon them. The bones of the skull are immovably united together; there

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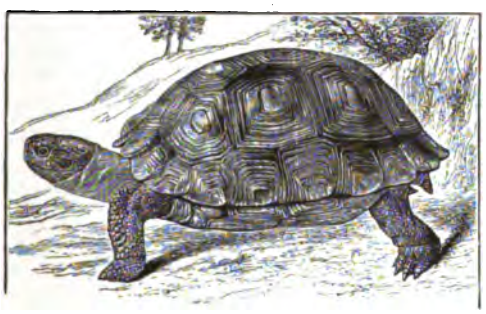
are no teeth, although in an embryonic turtle (Trionyx) traces of them have been detected. The limbs are very typical, and the girdles, which are over-arched by the ribs in the course of development, are well developed. There is no breastbone, and, according to most authorities, there are no clavicles. The brain of the adult Chelonian shows a slight curvature, and, as in all higher vertebrates except snakes, there are twelve cranial nerves, two more than occur in amphibians and fishes. The heart, as in other reptiles except crocodiles, is anatomically three-chambered, but the presence of an incomplete partition in the ventricle makes it work almost as if it had four chambers. The food-canal, ureters, and genital ducts open into a common cloaca, to the wall of which in the males a penis is attached. The large lungs are fixed along the dorsal wall of the thorax. As the body is boxed in by shields which are often quite rigid, the contraction and expansion of the lungs in respiration must be due partly to their own elasticity, partly to the movements of the viscera with which they are closely connected, and partly to the changes which result when the animal retracts or extends its head and limbs. At the



Tortoise (*Testudo elephantopus*).

best the respiration is sluggish; and, as this will affect the whole pitch of the animal's life, the sluggishness may be regarded as the price paid for the very strong armature.

Tortoises excel most animals in their tenacity of life. They can live for a long time without food; they are very difficult to kill, and even after the brain has been destroyed life lingers long in the body. It is said that a headless tortoise has been observed to walk 200 yards twenty-four hours after decapitation; and it is well known that the heart removed from the body will, if carefully suspended in a moist chamber, continue capable of beating for two or three days. All Chelonians are oviparous. The eggs have a firm shell, which is in most cases rigidly calcareous. They are usually laid in the sand or mud, and left to be hatched by the warmth of the sun.

There are two sub-orders of Chelonians—(*a*) Athecata, in which the carapace is flexible; and (*b*) Testudinata, in which it is rigid. The Athecata are represented by one living species, the Trunk-back or Leather Turtle (*Sphargis coriacea*), the largest modern Chelonian, sometimes measuring six feet in length, and sometimes weighing over a thousand pounds. It is widely but very sparsely distributed in tropical and temperate seas—in the Atlantic, Pacific, and Indian oceans, and in the Mediterranean. It is said to be herbivorous.

The Testudinata include four families—Chelonidæ, Testudinidæ, Chelydidæ, and Trionychidæ. The Chelonidæ are strong marine turtles, with flipper-like feet, and broad, partially ossified shields. A well-known representative is the Green Turtle (*Chelone mydas* or *viridis*), which occurs along the Atlantic coast from southern Brazil to Cape Hatteras. It feeds on the roots of the sea-grass (Zostera), and attains a very large size (sometimes weighing 850 pounds), and is the most important of the edible turtles. Both the flesh and the eggs are much esteemed. Notable, also, is the Hawk's-bill Turtle (*Caretta* or *Eretmochelys imbricata*), a ferocious carnivorous form occurring

Hawk's-bill Turtle (*Caretta imbricata*).

along the coasts of the United States, and supplying most of the commercial 'tortoise-shell.' The flesh is slightly esteemed, but the eggs are palatable. The same is true of the Loggerhead (*Thalassochelys caouana* or *Caouana caretta*), a large Atlantic turtle, also carnivorous in habit. The Testudinidæ are terrestrial Chelonians, such as the Greek Tortoise (*Testudo græca*) often brought from Mediterranean countries to Britain, where it usually leads a miserable existence as a pet. Notable are the gigantic forms (*Testudo elephantopus*, &c.), which were once abundant in the Galapagos Islands and in some islands of the Indian Ocean, but are now in process of rapid extermination. The Chelydidæ are Chelonians with long necks which are not retractile within the carapace. The strangest of these is the bearded Turtle (*Chelys matamata*), a carnivorous form once abundant in fresh-water pools in tropical South America. The Trionychidæ or soft-shelled turtles, are fresh-water forms with depressed bodies, covered with soft skin, and webbed yet partly clawed feet. A typical representative is *Aspidonectes ferox*, which lives in the rivers flowing into the Gulf of Mexico, and is famous for its activity, voracity, and fierceness. They usually measure rather over a foot in length. Their flesh is very palatable. See also TERRAPIN.

According to another classification, the Testudinata are divisible into two groups, distinguished by the manner in which the head is retracted. In one set—the Cryptodirans, or hidden-necked Chelonians—'the head is drawn directly within the margin of the shell by the bending of the neck in an S-like manner in a vertical plane.' In the other—the Pleurodirans, or side-necked Chelonians—'the neck is bent sideways, so that the head, when retracted, lies on one side of the front aperture of the shell near one of the legs.'

TORTOISE-SHELL, the large scales of the carapace or shield of a species of sea-turtle, the *Caretta imbricata* (see above). Tortoise-shell is so called because formerly the order of animals to which it belongs was little known, and all were confounded under the general name of Tortoises. A remarkable peculiarity in this species is the arrangement of the thirteen plates forming the carapace, which, instead of being joined together by their edges so as to make apparently one piece, are thinned off at their edges, and overlap each other like the tiles of a roof. They vary in size according to the part of the shield they occupy. The larger are sometimes from a foot to 18 inches long, by 6 inches broad; the thickness rarely exceeds the eighth of an inch. The beautiful mottled colour and semi-transparent characters of this material are well known. A remarkable quality

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is possessed by tortoise-shell which very greatly increases its usefulness for the ornamental purposes to which it is generally applied—i.e. the property of being easily softened by a heat equal to boiling water, and of retaining any form when cold which has been given to it when heated. Pieces can also be welded together by the pressure of hot irons properly applied. In Britain the chief use of tortoise-shell is making combs for the hair; but it is also used for inlaying ornamental furniture and various other fancy objects. By the French cabinet-maker Boule (see BUHL) it was used most effectively in combination with brass as a veneer for rich furniture, and all boule or 'buhl' work consists of such a veneering combination. In India, China, and Japan many articles are made of it, showing great skill and taste.

Tortola. See VIRGIN ISLANDS.

Tortona, a town of Northern Italy, on a small tributary of the Po, by rail 13 miles E. of Alessandria. Pop. 7147.

Tortosa, an old town of Spain, 40 miles SW. of Tarragona by rail, on an eminence overlooking the Ebro, 20 miles from its mouth, with some trade and manufactures. Pop. (1887) 25,192.

Tortugas (Sp., 'turtles'), DRY, a group of ten islets or keys belonging to Florida, at the entrance of the Gulf of Mexico, 120 miles WSW. of Cape Sable. They are very low, and partly covered with mangrove bushes; on Garden Key there is a lighthouse, and also a fort.

Torture has been largely used in many countries as a judicial instrument for extracting evidence from unwilling witnesses, or confessions from accused persons, and in the despotisms of the East is still so used; the callousness of torturers and tortured being almost equally remarkable. In ancient Athens slaves were regularly examined by torture. Under the Roman Republic only slaves could be tortured; under the Empire torture, besides being much used in examining slaves, was occasionally inflicted even on freemen, to extract evidence of the crime of *læsa majestas*. Cicero and other enlightened Romans wholly condemned its use. Until the 13th century torture seems to have been unknown to the canon law; about that period the Roman treason-law began to be adapted to heresy, the notions on which the Ordeal (q.v.) was based contributing to promote its use. At a later period torture came to be largely employed by the Inquisition, and it was only in 1816 that it was prohibited by a papal bull. Its use was universal in the witchcraft trials, and accounts for the strange uniformity in confessions.

From the civil law torture became a part of the legal system of most European countries. It was adopted early, and to a large extent, by the Italian municipalities. In Germany elaborate apparatus for its infliction existed, not merely in the dungeons of the feudal castles, but in the vaults beneath the town-halls of Nuremberg and Ratisbon. Horrible tortures were constantly inflicted in the 16th and 17th centuries; the 'second degree' included crushing the thumbs, feet, or head in iron apparatus, and the 'third degree' burning the sides, arms, and finger-nails with fire or red-hot irons and pincers. Torture continued to be practised in many of the prisons of Germany when they were visited by Howard in 1770; but in Prussia it was abolished in 1740–54, and the example of Frederick the Great contributed greatly to its final suppression. In Hanover it was not formally abolished till 1840. The torturing of prisoners was carried to a great height in the Low Countries under Philip II. Savonarola and Galileo are amongst famous men who suffered torture. In France it was part of the judicial system till 1789, and in Scotland it was still in frequent use after the Restoration, and was only abolished in 1708. Torture in its most pitiless form was a characteristic feature of the atrocious Templar trials in France. Amongst enlightened men who denounced the worthlessness of confessions secured by torture Bayle, Thomasius, Voltaire, and Beccaria deserve mention. In Naples torture was in use in 1860.

The use of torture seems always to have been repugnant to the genius of the law of England: though occasionally used by an exercise of prerogative, it may be doubted whether it was ever recognised as lawful in the ordinary course of the administration of justice. It was employed by royal warrant in the Templar trials (1310), and we are told that till that time it was unknown in England. During the Tudor period the Council assumed the power of directing torture-warrants to the lieutenant of the Tower, and other officers, against state prisoners, and occasionally also against persons accused of other serious crimes; and similar warrants were at times issued under the sign-manual. Under James I. and Charles I. torture was less resorted to, and only in state trials. In 1628, in the case of Felton, the assassin of the Duke of Buckingham, the judges declared the examination of the accused by torture, for the purpose of discovering his accomplices, to be illegal. Torture was inflicted in England as late as 1592, in the case of the Jesuit Southwell (q.v.), in 1640 on Archer, who took part in an attack on Laud's palace, and as late as 1646 on witches. As late as 1806 Sir Thomas Picton (q.v.) was tried for having, as governor of Tobago, permitted a woman to be tortured under old Spanish laws. Torture is now disused in all countries of Europe, and is universally acknowledged to have been a most unsatisfactory mode of getting at the truth; often leading the innocent, from weakness, to plead guilty to crimes they had not committed.

The instruments of judicial torture have been various. The most celebrated is the Rack, the Boot, and Thumbscrew. More ingenious instruments were such as the Scavenger's Daughter (rather 'Skeffington's Daughter,' from a lieutenant of the Tower under Henry VIII.), a spiked iron frame, which closed its victim in a deadly embrace. The *Peine Forte et Dure* (q.v.) was a terrible form of torture. From torture for the sake of extracting evidence must be distinguished cruel punishments and modes of putting to death by lingering tortures—mutilation, breaking on the wheel, burning at the stake, disembowelling, &c. (see EXECUTION). Notable instances of such were the tortures inflicted on the murderers of James I. of Scotland in 1437; on Damiens (q.v.), the would-be assassin of Louis XV. in 1757; and on Jean Calas (q.v.) in 1762. See also FLOGGING, PILLORY, STOCKS. Prison discipline was formerly little short of torture, including the use of bilboes and other dreadfully heavy irons; as also was the management of the insane; and the school punishments of comparatively recent times would now be regarded by many as falling under the same head. Powell's *American Siberia* (1892) describes a state of things in the convict-camps of the United States down till 1875 which may fairly be regarded as amounting to cruel torture—including the stringing of convicts up by their thumbs. The marvellous collection of instruments of torture (including the 'Iron Maiden,' resembling the 'scavenger's daughter') once used with hideous effect, and long on show as curiosities in Nuremberg, was bought by Lord Shrewsbury, and exhibited in London in 1891.

See INQUISITION, and works cited; WITCHCRAFT; BOOT, RACK, THUMBSCREW; Jardine, *Torture in the Crim. Law of England* (1837); Lecky, *Rationalism in Europe* (1865); Lea, *Superstition and Force* (Phila. 1866; new ed. 1878).

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Toru Dutt, a young Christian Hindu girl of extraordinarily precocious genius, was born in Calcutta, March 4, 1856, studied French and English literature with avidity, spent the years 1869–73 in England and France, and at eighteen published a critical essay of strange maturity on Leconte de Lisle, with translations into English verse. She next gave herself to Sanskrit, and translated several portions of the *Vishnupurana* into English blank verse. In 1876 she published *A Sheaf gleaned in French Fields* (2d ed. Lond., with Memoir by her father, 1880), being English translations of about two hundred French poems. Next year she died, August 30, 1877. A romance which she had written in French, *Le Journal de Mdlle. d'Arvers*, was published at Paris in 1879, with a study by Mdlle. Clarisse Bader. Finally her *Ancient Ballads and Legends of Hindustan* was published at London in 1882, with a Memoir by E. W. Gosse.

Torula. See YEAST.

Tory (Irish *toiridhe*, 'a pursuer'), a name first given to certain bands of outlaws, half robber, half insurgent, who professed the Roman Catholic faith, and harassed the English in Ireland. It is used in this sense in Gayton's *Pleasant Notes upon Don Quixot* (1654), the Irish State Papers (1656), and R. Burney's *Kerdiston Dōron* (1660)—'Wilful peasants . . . degenerate into *torees* and moss-troopers.' About 1679, the time of the Popish Plot, it began to be applied as a term of reproach to the Cavalier or Court party, as supposed abettors of that trumped-up conspiracy. Oliver Heywood's *Diaries* (ed. by J. H. Turner, 1881) refer, under the date 24th October 1681, to 'the Ranters calling themselves Torys . . . an Irish title for outlawed persons,' which shows that the nickname was soon adopted by one of the two great political parties in Great Britain—the adherents, namely, of the ancient constitution of England without change, supporters of regal, ecclesiastical, and aristocratic authority; 'their prejudice,' said Dr Johnson, 'is for Establishment, while that of the Whigs is for Innovation.' As Whig (q.v.) has been largely superseded by Liberal, so, since 1830, has Tory been by Conservative (q.v.). Since 1880 it has a good deal revived, in the sense frequently of a non-conservative Conservative.

See Kebbel's *History of Toryism from Pitt to Beaconsfield* (1885); and Standish O'Grady's *Toryism and the Tory Democracy* (1886).

Tory Island, a small island, 2½ miles long, 9 miles off the north-west coast of Donegal, with a lighthouse, and a signal station (1890) connected by telegraph with Londonderry.

Totem, a natural object, not an individual, but one of a class, taken by a tribe, a family, or a single person, and treated with superstitious respect as an outward symbol of an existing intimate unseen relation. The Algonquin word is *otem*, which must always be preceded by the personal article, as *kit-otem* = the family-mark, *nind-otem* = my family-mark. Other dialects have different names, as the Iroquois *ohtara*. The wide distribution of Totemism among the nations of the Old World, civilised as well as savage, and its significance as at once a religious and a social system, was first pointed out by Mr J. F. M'Lennan in the article TOTEMISM in the first edition of this work (1868) and in a series of articles in the *Fort. Rev.* (Oct. and Nov. 1869 and Feb. 1870); the richest collection of data yet made is Mr J. G. Frazer's *Totemism* (Edin. 1887).

The totem is considered as helpful to the man, who in his turn abstains from killing it if an animal, or eating it if a plant, and who often assimilates himself to it by wearing its skin or the like, or tattooing its picture on his body. The whole members of the clan who have a totem in common count themselves of one blood, and claim the totem as their common ancestor. The restriction upon killing and eating it is absolute, and sometimes men are tabooed from touching or even looking at it under pain of death or expulsion from the tribe. Elaborate ceremonies connected with birth, marriage, and death point more closely to the identification of the man and the totem, and such ceremonies as those of the Australians at puberty are intended to initiate the youth into the restrictions that must be observed in sexual commerce. In Australia also we find special sex-totems, which it is forbidden the opposite sex to kill; and among the North American Indians special personal totems—*manitous*—which are usually revealed after the exhaustion of the long fast at puberty. Totemism thus forms the foundation of a vast social system of alternate obligation and restriction. It governs marriage and all sexual relations, for a man may not touch a woman of the same totem as himself. Sometimes the prohibition only extends to a man's own totem clan, but more frequently it includes several clans, in none of which is it allowed to marry. Such an exogamous group of clans within the tribe is a *phratry*, which was no doubt originally itself a totem clan that had since undergone subdivision. In Australia we find not infrequently a tribe divided into two phratries, each including a number of totem clans; sometimes sub-phratries again come between the phratries and the clans, still further by vexatious restrictions curtailing the liberty of marriage. But the allowable range of kinship may stretch over a thousand miles, and the native by no means needs spoken language to discover the women with whom he may have commerce, for the totem marks upon their bodies give him the plain indication of duty. For the significance of Totemism in rudimentary religion, see ANCESTORS (WORSHIP OF) and ANIMALS (WORSHIP OF); and for its importance on the social side, in laws of descent, whether through the male or female line, and in marriage, see FAMILY and MARRIAGE.

Mr J. F. M'Lennan, in his inquiry into the origin of Exogamy, concluded that it was based on an antecedent system of Totemism, evidence of which was generally found in all rude societies acknowledging kinship through women only, the same association being found almost as generally in those rude societies which know kinship through males, while the worship of plants and animals in more advanced societies acknowledging kinship through males was lineally descended from Totemism. Mr Donald M'Lennan (preface to *The Patriarchal Theory*, 1885) tells us that his brother had come to abandon his original theory as to the origin of Totemism, and that, in the final constructive work to have been completed had he lived, his aim was to have been rather to show its prevalence, to establish some leading points in its history, to exhibit it in connection with kinship and with Exogamy, and to make out its connection with worship. He tells us, further, that the general conclusion appeared to his brother to be that it was possible to demonstrate that, Totemism preceding Exogamy, the latter must have arisen in societies acknowledging no kinship save through women; that all other facts bearing on rude society may be interpreted as evidence of a gradual progress from the condition of which Totemism and female kinship are the mark; and that thus it was possible to exhibit the history of human society as that of an evolution moving with very various rapidity among different populations, but always beginning with a condition in which the idea of incest did not exist, and always tending upwards from that

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condition. Whether or not this lowest step in the argument may be accepted—and grave objections enough will be found conveniently grouped in chap. xiv. of Westermarck's *History of Human Marriage* (1891)—the want of Mr M'Lennan's book is a loss to the science of Sociology that will not soon be made good.

Totila. See GOTHS, Vol. V. p. 323.

Totnes, a municipal borough and market-town of Devonshire, pleasantly situated on the slope of a steep hill on the right bank of the Dart, 29 miles SSW. of Exeter and 24 ENE. of Plymouth. The Dart is navigable to this point for vessels of 200 tons, and Brut the Trojan is fabled to have landed here: the 'Brutus Stone,' on which he first set foot, may be seen in the main street. At least, Totnes is a place of great antiquity, and retains two gateways, remains of the walls, a quaint guildhall, a good many antique houses, and an interesting Perpendicular church (1432; restored by Scott, 1874), with a noble red sandstone tower and a fine stone screen. The Norman castle of Judhael de Totnes, that crowns the hill-top, is represented by the circular shell-keep. There is a grammar-school (1568); and on the 'Plains,' near the river, stands a granite obelisk to the Australian explorer Wills, who was a native, as also was the Hebraist Kennicott. Incorporated by King John, Totnes returned two members till 1867. Pop. (1851) 4419; (1891) 4016. See works by W. Colton (1850) and Charles Worthy (2 vols. Exeter, 1889).

Toucans (*Rhamphastidæ*), a family of Zygodactyle Picarian birds, numbering more than fifty species, and inhabiting tropical America. They were formerly placed near the Hornbills (Bucerotidæ), which offer several points of analogical resemblance to them, and are often improperly called toucans in the East; but their nearest allies are now known to be the Barbets (Capitonidæ), one of which, *Tetragonops rhamphastinus*, strongly resembles a toucan in its coloration, &c.

Toucan (*Rhamphastos Toco*).

The toucans are divided into five genera: *Rhamphastos*, containing the typical species, has the bill most greatly developed, and the plumage mostly black, varied with white, scarlet, and orange; *Andigena*, containing the Hill Toucans, inhabiting the high forests of the Andes, and with a generally bluish-gray plumage; *Pteroglossus*, with smaller, long-tailed species, clothed in green, scarlet, and yellow plumage, and called Araçaris; *Selenidera* includes the Toucanets, which are very similar; the species of the last genus, *Aulacorhamphus*, are of a bright green colour. The legs of the toucan are strong, rather short, and with large scales; the toes are arranged in pairs, the first and fourth being turned backward. The form of the body is short and thick; the tail is rounded or even, varying in length, in the different species from half the length to almost the whole length of the body, and is capable of being turned up over the body in a remarkable manner, which it always is when the bird is at roost. The neck is short and thick; the enormous bill is at the base of the full width and depth of the head, and is in some species more than half the length of the body. It is arched towards the tip, irregularly toothed along the margins of the mandibles, and extremely cellular and light, yet strong in structure. The tongue is very long, narrow, and singularly feathered on each side, the processes which give it this feathered appearance possibly adding to its sensibility as an organ of taste. When a toucan takes food between the points of the mandibles, the tongue is immediately applied to it, as if to test or enjoy it, and afterwards it is tossed into the throat by a sudden throwing back of the head. Toucans may almost be described as omnivorous; they eat fruits with avidity, but they also seize and devour small birds. Their powerful bill enables them to kill a small bird by a single squeeze. They make a curious clattering noise with their great mandibles, and also emit at times a harsh cry, sometimes resembling the word *tucano*, whence their name. They live chiefly in the depths of the South American forests, in small flocks, and lay two white eggs in the holes of trees. They are easily tamed, and bear cold climates well. In captivity they readily eat rice, bread, potatoes, eggs, and many other kinds of food. They are remarkable amongst birds for regurgitation of food, in order to a kind of mastication in the great bill, analogous to rumination in quadrupeds. The colours of the bill are, in most of the species, very brilliant during life, but disappear from stuffed specimens in museums. The largest species, as *Rhamphastos Toco*, are about two feet in length; the *R. Ariel* is the commonest species. See Gould's *Monograph* (2d ed. Lond. 1854).

Touch, the tactile sense, the least specialised of the senses. The sense-organs of the various groups of animals are discussed in the articles on the various groups. In the nervous system of man the organs of touch are (1) central end-organs (see BRAIN); (2) conducting nerve-fibres (see NERVOUS SYSTEM); and peripheral end-organs. Nerves end in the skin in two ways. In the simplest mode of termination they form a plexus in the dermis, pass outwards from this, lose their medulla, divide into fibrils, and are lost to view in or between the cells of the epidermis. Nerves end in this way in all parts of the skin, but the relative number of such terminations in different parts of the skin cannot be determined by present methods of research; they may be easily seen in the cornea. In the more complex mode of termination the nerves, retaining their medulla, end in the dermis in special structures of modified neurilemma and other cellular elements. These endings are of three sorts. (*a*) The *end bulbs* are round bodies 30 μ to 100 μ in diameter (μ is the diameter of a red blood-corpuscle), and of limited distribution, found in the conjunctiva, the lips, also in mucous membranes—e.g. on the tongue, the palate and elsewhere, and, slightly modified, in the sensitive parts of the genital organs; (*b*) *Touch corpuscles* are oval bodies 60 μ to 100 μ in long diameter, also of limited distribution, but most numerous in the papillæ of the dermis of the palmar surface of the hand, less numerous in the nipple of the breast, very scarce on under surface of the forearm, absent from the greater part of the surface of the body. It is estimated that on the tip of the forefinger there are 100 touch corpuscles for two square millimetres. (*c*) *Pacinian corpuscles* are larger bodies, 1 millimetre and more in length, like end bulbs, found in the subcutaneous tissue. There are about 600 in the under surface of each hand, and a few may occur in the back of the hand; they are numerous at the

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joints, are found also on some periosteal nerves, and on the sympathetic nerves of the abdomen. From their distribution it is evident that they may or may not be essential to cutaneous sensibility. Indeed it seems that the touch corpuscles also are not essential to touch, for they are completely absent in certain parts of the body—e.g. the cornea—which are yet sensitive to pressure. Further, if those points of skin which are found by experiment to be peculiarly sensitive are cut out and examined, special nerve endings are not always to be found. Still the fact that as a general rule such endings are most frequent in areas of great sensibility compels the belief that they have some relation to that sensibility. The varying degrees of sensibility in the touch-organs are described at SENSATION, where also reasons are given for holding that the muscular sense is distinct from the tactile sense (see also SKIN, and TASTE). The functions of touch as a means of perception is dealt with at PSYCHOLOGY.—Touching for the king's evil is discussed at SCROFULA.

Touch-paper. See NITRE.

Touch-stone, a hard black stone, occasionally used in assaying. The original kind was a peculiar bituminous quartz or flinty slate obtained from Lydia in Asia Minor, and hence known as Lydian Stone; but black basalt may be employed. The process is explained at ASSAYING, Vol. I. p. 507.

Touch-wood is the wood of willows and some other trees softened by decay; Amadou (q.v.) is also so called. It is used as tinder, from the readiness with which a spark ignites it.

Toul, a fortified town in the French department of Meurthe-et-Moselle, on the Moselle, 20 miles W. of Nancy by rail. It has a former cathedral (965–1496), whose west front, with towers 245 feet high, is reckoned one of the finest in France, an 18th-century hôtel-de-ville, and manufactures of lace, hats, &c. The *Tullum Leucorum* of the Romans, Toul maintained a semi-independence till 1545; on 23d September 1870 surrendered to the Germans after an eight hours' bombardment; and since 1871 has been strongly fortified with a cordon of forts. Pop. (1872) 6584; (1891) 11,728. See works by Thiery (1841) and Daulnoy (1887).

Toulon, a seaport and naval arsenal of France, in the department of Var, stands on the shore of the Mediterranean, 42 miles ESE. of Marseilles and 564 SSE. of Paris. It lies at the head of a deep double bay, and rises towards the north in the form of an amphitheatre. The port is divided into two parts, the old and the new—the former, on the east, appropriated to merchant shipping, and the latter, on the west, surrounded by the dockyard, slips, arsenal, cannon-foundry, &c. The dockyard covers 240 acres; and belonging to the arsenal, which is perhaps the finest in France, are the sailyard, armoury, museum, &c. The fortifications were greatly extended after the conquest of Algeria (1830), Toulon becoming the chief port of communication with Africa; and important works of defence have been added since 1880. A cathedral, founded in 1096, the hôtel-de-ville, and a large theatre are the chief buildings. The climate is dry and bracing; but the older portions of the town are still unsanitary, and it suffered much from cholera in 1884. Pop. (1872) 69,808; (1891) 74,144. The Greek *Telonion* and Roman *Telo Martius*, Toulon suffered much from the Saracens, and first rose into importance as a naval stronghold towards the close of the 16th century. The English were defeated off here by the united fleets of France and Spain, 11th February 1744; and in 1793 Toulon was occupied for four months by the English (under Hood) and the Spaniards, who, however, were forced to evacuate the place after being fiercely attacked by the Republicans—a memorable siege as the first great achievement of Napoleon (q.v.). See Lambert's *Histoire de Toulon* (1886 *et seq.*).

Toulouse, an important city in the south of France, the capital anciently of Languedoc, and now of the department of Haute-Garonne, 160 miles SE. of Bordeaux and 466 S. by W. of Paris. It is situated in a broad and pleasant plain, on the right bank of the river Garonne, with the Canal du Midi sweeping round its eastern and northern sides. The Garonne is crossed here by a beautiful bridge (1543–1626), nearly 300 yards long, which connects Toulouse with the suburb of St Cyprien. The city, with the exception of the southern faubourg, is not particularly handsome (though the broad quays have rather an imposing appearance), nor has it many fine public buildings. One may note, however, the cathedral, containing the tombs of the Counts of Toulouse; the *Capitole*, or town-hall (1769); the church of St Sernin (11th to 15th century); and the Musée, with its interesting collection of antiquities, forming an almost uninterrupted chain in the history of art, from the Gallo-Roman to the Renaissance period. Toulouse is the seat of an archbishop, has a university academy, an academy of 'floral games' (*Société des Jeux Floraux*), claiming to date from a troubadours' contest in 1323, academies of arts, sciences, antiquities, &c., schools of law, medicine, and artillery, an observatory, botanic garden, and a public library of 60,000 volumes. Toulouse manufactures woollens, silks, leather, cannon, steam-engines, tobacco, brandy, &c., and carries on a great trade with Spain. Its liver and truffle pies are celebrated throughout the south of France. Pop. (1872) 114,025; (1891) 136,292.

Tolosa was, in Cæsar's time, a city within the limits of the Roman *provincia*, and had been originally the capital of the Volcæ Tectosages, a Gallic tribe noted for its wealth and consequence. Under the empire its importance continued. Ausonius describes it as surrounded by a brick wall of great circuit, and so populous that it had founded four colonies. In 412 A.D. the Visigoths made it the capital of their kingdom (see GOTHS); and after the time of Charlemagne it was under the sway of counts, who made themselves independent about 920, but in 1271 the 'county of Toulouse' was reunited to the crown of France by Philippe *le Hardi*. Its literary celebrity reaches as far back as the Roman empire. Ausonius speaks of the *toga docta* of 'Palladian' Tolosa, and the favourite deities of the city were Jupiter, Minerva, and Apollo. At a neighbouring village a multitude of cinerary urns, statuettes, Phœnician, Celtiberian, Gallic, Greek, and Roman medals, fragments of buildings, and an entire paved street have been discovered. Early in the middle ages, under the Counts of Toulouse, it became a seat of Provençal poetry, and it suffered terribly in Simon de Montfort's pitiless papal crusade against the Albigenses (q.v.). The parliament of Toulouse had a great reputation, but unhappily it is likely to be best remembered by one of its most iniquitous decisions, that delivered in the case of the Calas (q.v.) family. In the battle of Toulouse (10th April 1814) the French under Soult were defeated by Wellington. Cujacius was born, and Fermat died, at Toulouse. The floods of 1855 and 1875 were specially disastrous.

See works by Aldeguier (1835) and Jourdan (1877), and *Toulouse: Histoire, Archéologie, &c.* (1887).

Toung-ngu, a town of Burma, on the Sittang River, 170 miles NE. of Rangoon by rail, and capital of a district of Tenasserim. Pop. 17,119.

Touraco (*Opisthocomus cristatus*), called also Hoatzin, Cigana, Gypsy, and several other names, a bird about the size of a pheasant, found in

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Guiana and the Amazon region, and constituting the family Opisthocomidæ and order Opisthocomi. Wallace remarks that it has 'such anomalies of structure that it is impossible to class it along with any other family. It is one of those survivors

Touraco (*Opisthocomus cristatus*).

which tell us of extinct groups, of whose past existence we should otherwise, perhaps, remain for ever ignorant.' The most striking anomalies are the sternal apparatus, the divided muscular crop, and the reptilian character of the head of the unhatched chick. It lives in flocks on the lower trees and bushes bordering streams and lagoons, and feeds on various wild fruits, is never seen on the ground, and is nowhere domesticated. Its flesh is uneatable owing to its unpleasant odour.

See Bates, *The Naturalist on the Amazons;* Huxley, *Proceedings of the Zoological Society* (1868); Garrod, *Proceedings of the Zoological Society* (1879); Quelch, *In the Ibis* (1890). The name is also given to some of the quite different Plantain-eaters (q.v.) of Africa.

Touraine, one of the old provinces of France, of which the capital was Tours (q.v.), and which coincided with the department of Indre-et-Loire and a part of Vienne. See *Old Touraine*, by T. A. Cook (1892), and *La Touraine*, by Robida (1892).

Tourcoing, a frontier town of France, dept. of Nord, 10 miles NE. of Lille by rail, has manufactures of cotton, wool, linen, and silk goods, soap, beet-sugar, and machinery. Pop. (1881) 50,268; (1891) 65,477.

Tourmaline, a mineral which has a very complex and somewhat variable chemical composition. The chief constituents are silica and alumina in nearly equal proportions, and forming about three-fourths of the whole. The remainder consists of boracic acid, ferrous oxide, manganous oxide, magnesia, lime, soda, potash, and lithia, which are not all present, however, in any specimen. Tourmaline has a hardness = 7 to 7·5, and is thus harder than quartz, but not so hard as topaz. Its specific gravity is 2·94 to 3·3. It crystallises in rhombohedral forms, which are usually hemihedral, the prisms being often triangular or six-sided, and variously acuminated. The mineral has a vitreous lustre, and varies from transparent to opaque. The most common colours are black, brownish black, and bluish black; blue, green, and red varieties also occur; but white or colourless kinds are rare. Red tourmaline is known as *rubellite;* pale blue or bluish black as *indicollite;* Berlin-blue and transparent as *Brazilian sapphire* (in jewellery); green and transparent as *Brazilian emerald, chrysolite*, or *peridot of Brazil;* honey-yellow as *peridot of Ceylon;* colourless as *achroite;* black as *schorl.* Tourmaline occurs frequently in drusy cavities in granite, and also as an accessory mineral in granite, gneiss, and many crystalline schists, as also in certain granular dolomites and crystalline limestones associated with schists and plutonic rocks. Not infrequently it occurs along with various precious stones in the sands and alluvia derived from the disintegration of plutonic rocks and crystalline schists, as in Ceylon, Siberia, and Brazil. Various kinds are found in the Shan districts of Burma. The finest tourmalines are much valued by jewellers, but are comparatively rare. The black variety, *schorl*, is common in many of the granites and schists of Britain.

Tournament, a military sport of the middle ages, in which combatants engaged one another with the object of exhibiting their courage, prowess, and skill in the use of arms. Spectacles of this kind seem first to have become common in France, whence the usage spread to Germany and England, and afterwards to the south of Europe. A tournament was usually held on the invitation of some prince, who sent a king-of-arms or herald through his own dominions and to foreign courts. The intending combatants hung up their armorial shields on the trees, tents, and pavilions round the arena for inspection, to show that they were worthy candidates for the honour of contending in the lists in respect of noble birth, military prowess, and unspotted character. The combat took place on horseback, or at least was always begun on horseback, though the combatants who had been dismounted frequently continued it on foot. The usual arms were blunted lances or swords; but the ordinary arms of warfare, called arms *à outrance*, were sometimes used by cavaliers who were ambitious of special distinction. Tournaments were the subject of minute regulations, which in some degree diminished their danger. The prize was bestowed by the lady of the tournament on the knight to whom it had been adjudged, he reverently approaching her, and saluting her and her two attendants. The period when tournaments were most in vogue comprised the 12th, 13th, and 14th centuries; and the place where the most celebrated English tournaments were held was the tiltyard near St James's, Smithfield, London. The church at first discountenanced tournaments, some of its decrees prohibiting persons from engaging in them under pain of excommunication, and denying Christian burial to a combatant who lost his life in one. The church seems, however, to have looked with more favour on these combats after the middle of the 13th century. During the 15th and 16th centuries tournaments continued to be held; and no better conception of a tournament can be gained than from the account of the combat at Stirling in 1448 between the knight-errant Jacques de Lalain and the Master of Douglas (Hume Brown's *Early Travellers in Scotland*, 1891). But by 1500 the alteration in the social life and warfare of Europe had changed their character, and they are rather to be regarded as state pageants than as real combats. The death of Henry II. of France, in 1559, consequent on a lance piercing his eye at a tournament, led to their general abandonment, both in France and elsewhere, and there have been few attempts to revive them even as mere spectacles. The progress of firearms helped also to put them out of fashion; but tournaments still took place in the reign of James I., and at the Hague in 1633 the Prince of Orange held a 'passage of arms,' in which Prince Rupert 'carried away the palme.' A magnificent entertainment consisting of a representation or imitation of the old tournament was given at Eglinton Castle in August 1839, by the thirteenth Earl of Eglinton: Lady Seymour was the Queen of Beauty, and many of the visitors enacted the part of ancient knights; among them

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Prince Louis Bonaparte, afterwards Napoleon III. —According to Ducange, the difference between a tournament and a joust is that the latter is a single combat, while in the former a troop of combatants encounter each other on either side. But this distinction has not been always observed.

Tournay (Flemish *Doornik*), a town in the Belgian province of Hainault, on the Scheldt, near the French frontier, 35 miles WSW. of Brussels. Its splendid Romanesque cathedral, 400 feet long, has five towers and pictures by Jordaens, Rubens, and Gallait; and there are also the churches of St Quentin and St Brice (with the grave of King Childeric), the belfry (1190), and a bronze statue (1863) of the Princess d'Épinoy, who in 1581 valiantly defended Tournay against Parma. Although one of the oldest towns in Belgium, it has quite a modern appearance, with fine suburbs and beautiful broad streets. The chief manufactures are hosiery, linen, Brussels carpets, and porcelain; but there are few large workshops, most of the fabrics being executed by the people in their own houses. Pop. (1880) 32,566; (1891) 35,403. Tournay, the ancient *Tornacum* or *Turris Nerviorum*, was in the 5th and the beginning of the 6th century the seat of the Merovingian kings, subsequently belonged to France, but in 1526 was included in the Spanish Netherlands. During May 1794 it was the scene of several hotly contested fights between the French and Austro-English armies, the most important of which was that of the 19th May, in which Pichegru beat the Duke of York. Fontenoy (q.v.) is 5 miles SE.

Tournefort, Joseph Pitton de (1656–1708), botanist, was born at Aix, travelled in Greece and elsewhere, and died professor in the Collége de France. His botanical system maintained its ground till the time of Linnæus, and his principal works were *Institutiones Rei Herbariæ* (1700) and *Éléments de Botanique* (1694).

Tourneur, Cyril, a dramatist, who flourished at the close of the reign of Elizabeth and the beginning of that of James I., but of whose history absolutely nothing is known beyond the fact (*Acad.* May 9, 1891) that he had seen service in the Low Countries, and died in Ireland, leaving his widow destitute, February 28, 1626. In 1600 he published his *Transformed Metamorphosis* (discovered in 1872), a satirical poem, obscure in expression, and marred, moreover, by pedantic affectations of style; in 1609 he issued a *Funeral Poem* on Sir Francis Vere, in 1613 an *Elegy* on Prince Henry. But his fame rests alone on two plays, the *Revenger's Tragedy*, licensed and printed in 1607, and the *Atheist's Tragedy*, printed in 1611, but undoubtedly written the earlier of the two. The plot of the latter is poor, though the versification is free and flowing; but when we turn to the *Revenger's Tragedy* we are at once arrested by its tragic intensity, the condensed power of passion, the fiery strength of phrase, the cynical and bitter mockery. The plot is an entangled web of lust and blood in which the dramatist moves with a mastery of the elements of tragic passion that brings him abreast of Webster, the closest of the followers of Shakespeare in one—but that not the greatest—of his moods. Tourneur's power has not escaped the unerring insight of Lamb and Hazlitt. Mr Fleay (*Biographical Chronicle of the English Drama, 1559–1642*) thinks the *Revenger's Tragedy* the work of the author of the *White Devil*.

The only complete edition is that of J. Churton Collins (2 vols. 1878), with a good critical introduction; the two plays are printed, together with Webster's *White Devil* and *Duchess of Malfi*, in the 'Mermaid' series, with an introduction by J. A. Symonds (1888).

Tourniquet, an instrument for compressing the main artery of the thigh or arm, either for the purpose of preventing too great a loss of blood in amputation, or to check dangerous hæmorrhage from accidental wounds, or to stop the circulation through an aneurism. For the last purpose special forms of tourniquet are required, which do not compress the whole limb.

The common tourniquet consists of three parts—viz. (1) a pad to compress the artery; (2) a strong band which is buckled round the limb; and (3) a bridge-like contrivance over which the band passes, with a screw whose action raises the bridge and consequently tightens the band. The best kind of pad is a small firm roller bandage, about an inch thick; it must be placed lengthways over the main artery so as to compress it against the bone, and must be secured in its place by a turn of bandage, over which the band of the tourniquet must be applied. This band must first be tightly buckled, and the pressure must be then quickly increased to the necessary extent (viz. till the circulation through the limb is completely arrested) by the action of the screw, which should always be opposite the buckle of the band.

Common Tourniquet.

The credit of the invention of this most useful instrument is usually ascribed to the French surgeon Morel, who, in 1674, used a stick passed beneath a bandage, and turned round so as to twist it up to the requisite degree of tightness, as a means of preventing the undue loss of arterial blood in amputations of the limbs—a rough but by no means ineffectual form of tourniquet, which may often be usefully extemporised in cases of emergency at the present time (see Vol. I. p. 702). Mr Young of Plymouth, in 1679, described a similar apparatus. A much improved screw tourniquet was invented by Petit in 1718, the same in principle as that described above. Many surgeons now use in preference a strong elastic band, wound two or three times round the limb—a method first introduced by Esmarch.

Tours, capital of the department of Indre-et-Loire, as it formerly was of the province of Touraine, stands in the fertile valley of the Loire just above the influx of the Cher, and is 147 miles SW. of Paris by rail. It is a regularly built and handsome town, nearly divided in half by the Rue Nationale. Conspicuous amongst its buildings is the noble cathedral, in various styles of Gothic from the 13th to the 15th century, the two towers (partly modified Renaissance) being 205 feet high. The glass is very fine. Other buildings are the church of St Julien, the towers and other remains of the famous abbey church of St Martin (long a place of pilgrimage, but destroyed at the Revolution), the archbishop's palace, palais de justice, museum, public library, &c. Near the town are the remains of the monastery of Marmoutier, and of the castle of Plessis les Tours, the favourite

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residence of Louis XI. (see *Quentin Durward*). There are some well-preserved ancient houses, including that of the executioner Tristan l'Hermite. Near Tours are many of the fine old chateaux for which Touraine is famous. There are fine statues of Descartes and Rabelais. Tours has a brisk trade, manufactures woollens and silk, does much printing, &c., and is famous for its plums and similar confections. Pop. (1872) 43,368; (1891) 60,335. The Roman *Cæsarodunum*, Tours was both earlier and later capital of the Turones (whence the modern name). Near it Charles Martel (q.v., Vol. III. p. 115) won the great victory that saved northern Europe from the Saracens. Meetings of the States-general and councils repeatedly took place here. The great silk manufactures of Tours, established in the 15th century, were destroyed by the Revocation of the Edict of Nantes (1685), which drove into exile nearly half of the most industrious inhabitants of the place. During the Franco-German war Tours was the seat of government from the time the Germans closed round Paris till (21st September) they in like manner closed round and then occupied Tours. St Martin and Gregory of Tours have separate articles. There are works on the city by Giraudet (1874) and Grandmaison (1879).

Tourville, ANNE HILARION DE COTENTIN, COUNT DE, was born at the chateau Tourville, near Coutances, 24th November 1642. Entering the French navy, he became, though of delicate health, almost immediately conspicuous for bravery and enterprise; and his early services in wars against the Turks and Algerines established his reputation. In 1677 he fought against the combined fleets of Spain and Holland. In the war which broke out after the English revolution of 1688, between France on the one part and England and Holland on the other, Tourville was put at the head of the French navy. In June 1690 he entered the English Channel with a powerful fleet, and inflicted a disastrous and ignominious defeat on the united English and Dutch armament near Beachy Head. Tourville ranged the Channel unopposed; and on 22d July his fleet cast anchor in Torbay. In 1692, Louis XIV. having resolved to invade England on behalf of James II., an immense fleet was assembled at Brest under Tourville in order to protect the descent. On the 16th May of this year the French fleet was descried from the cliffs of Portland, and on the following morning the English and Dutch force stood out to give battle. From the morning of the 19th to the afternoon of the 24th raged one of the greatest naval battles of modern times, that of Cape La Hogue (see TACTICS, NAVAL, p. 44). It ended in the complete defeat of the French, sixteen of their men-of-war being utterly destroyed. In spite of this disaster Tourville was graciously received at Versailles, as having maintained the honour of his country, and was made a Marshal of France. Sailing from Brest harbour in the spring of this year, he attacked an English merchant fleet under inadequate convoy, and succeeded in inflicting a damage on English traders estimated at some millions sterling. Sir George Rooke, who commanded the convoy, had some difficulty in saving his own squadron from destruction. This was the last exploit of the great French admiral; he died at Paris, 28th May 1701.

The *Mémoires* published in his name (1758) were not genuine. See Macaulay's *History;* and Delarbre, *Tourville et la Marine de son Temps* (1889).

Toussaint l'Ouverture (a surname added for his bravery in once making a *breach* in the ranks of the enemy), one of the liberators of Hayti, was born a slave in 1743, joined the negro insurgents in 1791, and at length in 1795, for his services against the Spaniards, was made by the French Convention general of brigade, in 1797 general of division, and a little later chief of the army of San Domingo. Soon after he cleared the British and Spaniards entirely out of the island, quickly restored order and prosperity, and about 1800 began to aim at independence of France. Bonaparte having, after the peace of Amiens, proclaimed the re-establishment of slavery in San Domingo, Toussaint declined to obey, whereupon General Le Clerc was sent with a strong fleet to compel him. The liberator soon submitted, but was treacherously arrested, sent to France, and flung into a damp, dark dungeon at Fort de Joux, near Besançon, where he sank after ten months, April 27, 1803. See his own *Mémoires* (1853), and Lives, also in French, by Saint-Rémy (1850), Gragnon-Lacoste (1877), and Schœlcher (1889).

Tow, the coarse or broken part of flax or hemp separated by heckling. See LINEN.

Tower. See CAMPANILE, SPIRE, and the articles on the various styles of architecture.

Tower Hamlets, originally certain parishes, hamlets, and liberties without the jurisdiction of the city of London, and once within that of the lieutenant of the Tower; now a 'parliamentary borough' or division of London, lying to the east of the City and Finsbury. Till 1885 it sent two members to parliament; since then it falls into seven electoral districts, each of which returns one member. The divisions are those of Whitechapel, St George's-in-the-East, Limehouse, Mile-End, Stepney, Bow and Bromley, and Poplar (see LONDON, p. 703).

Tower of London. See LONDON, p. 702.

Town-council, the governing body of a municipality. See BOROUGH; also ALDERMAN, BAILIE, CITY, MAYOR, MUNICIPALITY, PROVOST.

Townshend, CHARLES, VISCOUNT TOWNSHEND, statesman, was born in 1674, of a very old family, at Raynham in Norfolk. His father, Horatio, had been a prominent Presbyterian, but, having been one of the most forward in restoring the monarchy, was by Charles II. made Baron in 1661, and Viscount in 1682. He died in 1687, when Charles was only eleven years old. He, when of age to take his seat in the Upper House, entered public life as a Tory, but soon afterwards became a disciple of Lord Somers, and cordially co-operated with the Whigs. He was named by the Godolphin administration one of the commissioners for arranging the Union with Scotland; was joint-plenipotentiary with Marlborough at the Hague; and negotiated with the States-general the Barrier Treaty, which pledged the States-general to the Hanoverian succession, and England to procure the Spanish Low Countries for the United Provinces, as a barrier against France. Dismissed from his places in 1712, on the formation of the Harley ministry, Townshend maintained a close correspondence with the court of Hanover, and obtained the entire confidence of George I., who, while still at the Hague, on his way to his new kingdom, made him Secretary of State. With Stanhope he formed a ministry entirely Whig, in which Walpole, his brother-in-law, soon became Chancellor of the Exchequer. The principal act of the government was the passing of the Septennial Bill (1716); that same year saw Townshend's dismissal. After the bursting of the South Sea Bubble, and the deaths of Sunderland and Stanhope, Townshend (1721) again became Secretary of State. But he was no longer the acknowledged leader of the Whigs. The superior talent of Walpole, his financial abilities, and his influence in the House of Commons caused a change in the relative position

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of the two ministers, and converted those who had been so long friends and colleagues into rivals and enemies. After Townshend had somewhat precipitately made the treaty of Hanover between England, France, and Prussia, an open and unseemly quarrel broke out between them. Walpole said he thought the firm should be Walpole & Townshend, not Townshend & Walpole; so it was, and Townshend retired into private life in 1730. He introduced the turnip into Norfolk from Germany, greatly improved the rotation of crops, steadily refused to reappear in public life, and died 21st June 1738. See works on Walpole, and Stanhope's *History*.

Townshend, CHARLES, wit, orator, and statesman, was second son of the third Viscount Townshend, and grandson of the foregoing. He was born 29th August 1725, and entered the House of Commons in 1747 as a supporter of the Pelham (Whig) administration. His first great speech was against the Marriage Bill in 1753. Upon the dissolution of the Whig government the Earl of Bute gained him by the offer of the post of Secretary at War; but on Bute's resignation in 1763 he was appointed First Lord of Trade and the Plantations—the versatility of his political career obtaining for him the appellation of 'the Weathercock.' In the Chatham ministry of 1766 he accepted the post of Chancellor of the Exchequer and leader of the House of Commons. When Lord Chatham in a distempered state of mind abdicated the post of first minister, Townshend manifested the greatest vanity, ambition, and arrogance. Finding the notion of an American revenue agreeable to the court, and not unpalatable to the House of Commons, he proposed and carried those measures of taxation of commodities in America that led to the separation of the American colonies. Townshend's wife was created a peeress, and he was about to be entrusted with the formation of a ministry when he was carried off by a putrid fever, 4th September 1767. The difference between his contemporary reputation and his fame is very striking. He was ranked as an orator with Pitt. Burke called him 'the delight and ornament of the House of Commons.' Macaulay speaks of him as 'the most brilliant and versatile of mankind,' who had 'belonged to every party and cared for none.' Earl Russell describes him as 'a man utterly without principle, whose brilliant talents only made more prominent his want of truth, honour, and consistency.' See his Life by P. Fitzgerald (1866).

Township, or VILL, the oldest proprietary and political unit of the Germanic races, an organised self-acting group of families exercising ownership over a definite area, the mark. The oldest English manors are conterminous with townships: the parish, a later division than the township, and originally purely ecclesiastical, is assumed to be equivalent to the township if there is no evidence to the contrary. In fact many parishes, especially in the north of England, consist actually of but one township; but generally they comprise more than one, and are subdivided into townships, hamlets, 'tithings,' 'boroughs,' or the like, none of which subdivisions, unlike the parish itself, has ever had a church or a constable of its own. For administrative purposes the township is subordinate to the Parish (q.v.).—In the United States the word is variously used (1) of a subdivision of a county; (2) the corporation composed of the inhabitants of such area; or sometimes (3) of municipal corporations only less fully organised and with fewer powers than a city.

Towton, a township in the West Riding of Yorkshire, where was fought, near Tadcaster (q.v.), one of the chief battles in the Wars of the Roses (q.v.).

Toxicology, the science of poisons, embraces the physical and chemical history of all known poisonous substances, the methods of testing for them, their action on the living body, the *post-mortem* results which they occasion, and (according to some writers) the medical treatment that should be adopted. See POISON.

Toynbee, ARNOLD, the second son of Joseph Toynbee, a famous aural surgeon, was born in London, August 23, 1852. From his father he acquired a taste for poetry and pictures. His early acquirements were mostly in the direction of modern literature and philosophy. He spent two years at a military college, but left on finding that he had mistaken his profession. During the four years he spent at Oxford he became a prominent figure amongst an attached circle of students, studied political economy, and read in a miscellaneous fashion. 'Most men,' he said, 'seem to lose their religious beliefs in passing through the university; I made mine.' He came under Ruskin's influence, did some practical work in road repairing, read his Bible diligently, and the Imitation. On taking his degree he became tutor to a number of young men who had passed the Indian Civil Service examinations, and who were further preparing themselves for their work at Balliol College. Endowed with the gift of fluent speech, he began to address audiences of working-men; and believing that the poor could only be adequately helped by those who had lived amongst them and felt their needs, he took up residence in Commercial Road, Whitechapel, in 1875, and associated himself with the religious work carried on there by the Rev. S. A. Barnett. His health gave way under his unwearied labours, and the noise, dullness, and dreariness of his surroundings, but from the inspiration of his example and teaching during this period sprang the idea of Toynbee Hall. He died in 1883, owing to overstrain following on two lectures directed against Henry George's *Progress and Poverty*. A course of lectures delivered at Oxford between 1881–82 on the economic history of England, along with other popular addresses, was published in 1884 under the title of *The Industrial Revolution*, with Memoir by Jowett. Toynbee was frank and unreserved, of transparent sincerity, had a keen sympathy with the life of the labouring classes, and was a close student of history. The residence house known as Toynbee Hall was organised in Commercial Street, Whitechapel, as a memorial to Toynbee in January 1885, under the direction of the Rev. S. A. Barnett. It partakes somewhat of the nature of both a college and a club, the idea being to connect the memorial of Toynbee with the study of 'political economy in its social aspects, to which he devoted the scholar half of himself, and with his work among the artisan population of our great cities, to which he gave the other, the missionary half.' This is carried out by the members of the universities of Oxford and Cambridge who find residence there, who strive 'to provide education and the means of recreation and enjoyment for the people, to inquire into the condition of the poor, and to consider and advance plans calculated to promote their welfare.' During the first four years there were fifty-four residents.

Toys. The most primitive toy of most abiding interest for children is the Doll (q.v.), already dealt with. But toys are of infinite variety, and the making of them forms a very important industrial occupation. Large numbers are made in London, Birmingham, and other places in Britain; but by far the greater number in Germany and Switzerland. Nuremberg is especially important in this respect. Squibs, crackers, &c. are somewhat dangerous toys (see PYROTECHNY), and there are

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many other ingenious applications of chemistry which combine amusement, instruction, and risk—e.g. the so-called Pharaoh's Serpents (see SULPHOCYANATES), &c. A valuable use of what may be called toys is made in the Kindergarten (q.v.).

Tracadie, a fishing-town on the east coast of the Canadian province of New Brunswick, 35 miles E. of Bathurst, with a hospital for lepers—the chief lazaretto of Canada. Pop. 2000.

Tracery, the beautiful forms in stone with which the arches of Gothic windows are filled or traced for the support of the glass. These forms vary with every variety of Gothic architecture, from the simple early forms to the Decorated (q.v.) and Flamboyant (q.v.). See WINDOW, PERPENDICULAR, CHAPTER-HOUSE, &c.

Trachea, or WINDPIPE, that part of the air-passages which lies between the Larynx (q.v.) and the bronchi (see RESPIRATION). It is very rarely affected by disease of independent origin, though often secondarily by extension of laryngitis from above, or of bronchitis from below.

Foreign bodies occasionally pass through the larynx into the trachea. In cases of this kind the patient who has had some foreign substance in his mouth which is supposed to have been swallowed is seized with a convulsive cough, threatening suffocation, but subsiding after a time. The symptoms that then ensue vary with the weight and figure of the substance, and according as it is fixed or movable. A large and very irregular body may be impacted in the trachea, and may thus more or less obstruct the respiration on both sides of the chest; and this obstruction will probably soon be increased by the inflammatory products that are excited. A small heavy object will usually pass through the trachea into one of the bronchi (usually the right), or one of its branches, obstructing respiration to a less extent. While a foreign body remains in the air-passages there is always more or less risk of suffocation, though a piece of bone has been coughed up after sixty years in that situation. The attempt to remove it, however, has also risks; and inversion of the obstructing object, which is commonly resorted to, should not be tried unless tracheotomy either has been performed, or can be done at a moment's notice. If attempts at removal are unsuccessful the foreign substance may become encapsuled and quiescent; but it more often sets up organic lung disease (pneumonia, gangrene, &c.).

TRACHEOTOMY.—The air-passages may be opened in several different situations—viz. through the thyroid cartilage (*thyrotomy;* only used for removal of growths, &c.); through the crico-thyroid membrane (see LARYNX; *Laryngotomy*); through the cricoid cartilage and the upper rings of the trachea (*Laryngo-tracheotomy;* very rarely used); and through the trachea, either above or below the isthmus of the thyroid gland (*Tracheotomy* proper, *high* or *low*, according to the part chosen). Laryngotomy is more quickly and easily performed, especially in adult males, and is less dangerous; tracheotomy is a more difficult, tedious, and dangerous operation, but in some cases (as, for example, where there is any necessity for introducing the forceps) must be selected. It is unnecessary to enter into details regarding the modes of performing these operations. When the operation is completed a large curved double tube to breathe through is inserted in the aperture, and the outer tube is secured round the neck with a tape. The inner tube should fit quite loosely into the outer, so that if it becomes obstructed it may have a chance of being ejected by the patient's cough, and that it may be readily removed and cleaned. The tube may be removed altogether in a few days, or may require to be worn permanently, according to the condition for which the operation has been performed. Amongst the cases in which tracheotomy is or may be required are cut throat, acute laryngitis, croup, diphtheria, chronic inflammation and ulceration of the larynx, necrosis of the laryngeal cartilages; tumours, excrescences, or epithelial growths within the larynx, foreign bodies below the glottis; tumours (bronchocele, abscesses, &c.) external to the larynx or upper part of the trachea, and impeding respiration by pressure, &c.

Trachyte, a crystalline igneous rock, generally grayish in colour, but not infrequently brown, or even sometimes yellow, green, or red. It is usually a fine-grained or compact rock, more or less markedly porphyritic, with large crystals of sanidine and scales of black mica. The ground-mass consists of a close aggregate of lath-like microliths of felspar, scattered amongst which are minute grains of other minerals, such as hornblende, augite, biotite, and magnetite. Various other minerals may also occur, such as apatite, olivine, haüyne, titanite, &c. Occasionally non-differentiated matter or glass is more or less abundant in the ground-mass, and when this is the case the rock often shows fluxion-structure. The essential constituents of trachyte, however, are sanidine (felspar), of which the rock is chiefly composed, and one or more of the ferro-magnesian bisilicates—biotite, augite, and hornblende. The rock has often a rough or harsh feeling (Gr. *trachys*, 'rough'), due to the abundant presence of minute vapour or gas pores, or to angular cavities between the several constituents of the ground-mass. Trachyte occurs both in the form of lava-flows and as intrusive sheets, dykes, and masses, and ranges from early Tertiary times to the present. There are many varieties. Some trachytes pass upwards into trachyte-pitchstone or obsidian.

Tractarianism, an important movement in the Church of England, which takes its name from a series of papers entitled *Tracts for the Times*, published at Oxford during the years 1833–41, hence called the 'Oxford Tracts.' In all, ninety were published; the principal writers were Pusey, Newman, Keble, Hurrell Froude, and Isaac Williams. See the articles ENGLAND (CHURCH OF), KEBLE, and PUSEY, but especially NEWMAN.

Traction-engines. Very early in the history of steam locomotion projects were formed for running locomotives on common roads; and many eminent mechanical engineers have devoted their energies to solving this difficult problem. There are three classes of such engines: (1) steam-carriages, for conveyance of passengers; (2) traction-engines, for hauling heavy weights; (3) agricultural engines, of a lighter type.

Steam-carriages.—It was to the conveyance of passengers by steam that all the plans of early inventors were devoted, and at the present day interest in them is chiefly historical. The main idea in all cases was to fit an engine and boiler to an ordinary carriage or coach. The boiler, usually carried at the back, was of some form possessing strength with little weight, and capable of rapidly raising steam; the engine also, either at the back or under the coach, usually worked a cranked axle, and the main axle carrying the two driving-wheels was driven from this by chain gearing; most of them ran on four wheels, though some had a fifth wheel as a steerer. Cugnot, a Frenchman, made a steam-carriage in 1769; it ran at 2¼ miles per hour, and carried four persons; a capsize in a street in Paris led to the imprisonment of the inventor, and put a stop to further trials. Murdock in 1782, Watt in 1784, Symington in 1786, and others made

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models, but the first one which actually ran in England was made by Trevithick and Vivian in 1803. This attained a speed of 8 or 9 miles per hour in the streets of London; but want of encouragement and difficulties produced by bad roads compelled Trevithick to turn his inventive faculties into other fields of work. Improvements in the main roads led to a great revival of interest about 1830, and during the years 1827–34 numerous more or less successful steam-carriages were built; one made by Sir Goldsworthy Gurney ran for three months in 1831 with passengers between Cheltenham and Gloucester, while Hancock's steam-omnibuses (carrying 14 to 16 passengers) ran pretty constantly during the years 1833–36 in London, and attained often a speed of 10 or 12 miles per hour; some of his coaches ran long journeys, such as from London to Brighton; he was in fact the most successful of all these inventors. Scott-Russell also constructed and ran in 1834 six steam-coaches between Glasgow and Paisley. However, the great opposition placed in their way by road trustees, and the gradual spread of railways, led to the abandonment of all these schemes, and practically nothing further has been done (see TRAMWAYS). In 1891, however, Serpollet patented an ingenious and successful steam-carriage with a flattened coil boiler. He uses superheated steam, and the engine is very economical; many trips have been made, and the carriage easily maintains a speed of 10 miles an hour.

Traction-engines for heavy loads.—The main difficulty with which builders of these engines have to cope has been the driving-wheels, the tires of which must be able to resist the great wear and tear and violent shocks caused by passing over bad roads or uneven ground, and must at the same time possess considerable adhesive powers, since the resistance to motion even on good macadamised roads is more than eight times as great as it is on rails. Boydell, who made the first successful engine in 1856, used a series of flat segments of rails, so jointed round the circumference of the driver that the engine ran, as it were, on an endless tramway; it was an extraordinarily noisy, clattering, unmechanical contrivance, still it gave great adhesion, and enabled his engines to drag heavy loads over exceptionally soft ground. A little later Bray brought out a wheel with rigid tires, fitted with short strong spikes projecting from the rim (these could be withdrawn when not wanted); this, again, had considerable adhesion, but was very destructive to the roads. R. W. Thomson of Edinburgh, in his so-called 'road-steamers,' adopted flexible india-rubber tires; the driving-wheels were light wrought-iron drums about 15 inches wide, with a flange at the sides; round the drum was stretched an india-rubber band 5 inches thick and 12 inches wide, protected on the outside with a flexible sheath of thin steel plates. This tire had the great advantage that it formed a perfect spring for the engine, and, flattening under the pressure, it gave a broad tread, and so increased enormously the adhesion; on paved roads with a gradient it had much better hauling power than any engine with rigid tires. The objection to the use of such tires is their heavy cost (those of the 'Ravee,' a road-steamer for service in India, cost £241), and the expense of renewals; they were, however, very successful, being employed in Glasgow and other towns hauling heavy castings, boilers, &c. from the workshops to the wharves. All these types and many others are now practically obsolete. The modern engine usually has rigid wheels, the rims are either cast-iron or wrought-iron, with diagonal wrought-iron cross strips riveted to them. Another kind of wheel, a good deal used, has rims of cast-iron with cells about 6 inches in the side, in which are placed hardwood blocks, projecting a little beyond the rim (an india-rubber pad between the block and the bottom of the cell acting as a spring); this gives a broad, flat tread, good adhesion, and does not damage the roads. The traction-engines now in use run on four wheels, the hind pair being drivers, the front pair steerers; the boiler is of the locomotive type, working usually at about 130 lb. steam pressure; the engine and attached parts are carried on the top of the boiler, cylinder at forward end, crank-shaft at firebox end. Motion goes from the crank-shaft to the driving-axle through steel spur-wheel reducing gear carried by other shafts. A differential compensating bevel gear is usually fitted, one driving-wheel being then loose on its axle; this enables the engine to turn corners without straining the axles. Springs are also now usually fitted, though their use somewhat complicates the method of supporting the gearing between the crank-shaft and driving-wheel axle; these, however, greatly reduce the shocks in passing over bad roads. Most of the engines now made have a winding-drum, which enables steep gradients to be overcome; the engine itself proceeds to the top of the incline, then a steel rope attached to the wagon carrying the load is gradually wound up on the drum, thus hauling up the load. To obtain increased power, the engines sometimes have two cylinders, and are also made compound; a stock of coal is carried in a bunker behind the foot-plate, and water in a tank under it. These engines are now most extensively used, and are much cheaper than horse traction; in one case the cost has been given as 2d. per ton per mile, including depreciation and interest on capital; where the roads are kept in good order they do no damage. The great obstacles to their more extended use are the legal restrictions in force—the speed shall not exceed 4 miles per hour, a man shall walk at least 20 yards in front with a red flag; and a license at quarter sessions must be taken out in every county in which the engine works. These are all mainly due to the fear of accidents through the frightening of horses.

Agricultural locomotives are essentially portable engines, fitted with various methods of self-propulsion—in some cases by pitch-chains, more usually by spur-gearing. They are much lighter in make, though otherwise very similar to traction-engines; they are employed mainly in drawing loaded wagons, thrashing-machines, &c. from farm to farm; by disconnecting the propelling gear and blocking the wheels, they can be used as stationary engines to drive by belting off the flywheel, with which they are always fitted, thrashing-machines, fans, and other farm plant. Fowler's steam-ploughs are locomotive; they are able both to pay out and wind up the steel rope moving the plough to and fro, and also to shift themselves along the field. Traction-engines are now made by all the chief firms of agricultural implement-makers (see Vol. VIII. p. 245); to the late Mr T. Aveling of Rochester, much of the present success of steam road-traction is due. In making macadamised roads, the rolling of the broken metal is now done by heavy steam-propelled rollers very similar in design to traction-engines.

Tract Society. In the 17th century several traces are found of associations for printing and promoting the sale of religious works, but none of them seems to have existed long. The 'Society for Promoting Christian Knowledge,' founded in 1701, had for one of its objects 'the dispersion, both at home and abroad, of Bibles and tracts of religion.' In 1750 was formed 'The Society for Promoting Religious Knowledge among the Poor,' not, like the former, confined to the Church of England, but embracing Christians of all denominations.

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The Religious Tract Society (1799) originated with the Rev. George Burder (q.v.). Its beginnings were humble, but it soon expanded; its income, from sales of publications and contributions of benevolence, including a small balance from the previous year, amounted in 1891 to £201,119, 5s. 5d., and the total expenditure, in trade and grant departments, to £199,444, 14s. 10d. In the same year 678 new publications were issued, 113 of which were tracts; the issue of books, tracts, &c. from the foundation of the Society until 1891 was 2,830,763,810. Its operations have extended over all quarters of the world, and it has issued books and tracts in 204 languages and dialects. The business of the Society is conducted by a committee chosen annually, which consists of four ministers and eight laymen, and six trustees. Half the number are members of the Church of England and the other half Nonconformists. It has produced many new works, reprints, and abridgments, and has half-a-dozen thriving periodicals, such as the *Leisure Hour*, *Sunday at Home*, *Boy's Own Paper*, and *Girl's Own Paper*. The number of separate tracts, books, &c. in the Society's catalogue is about 4000. Within recent years its publishing area has been much extended, and now the catalogue embraces works in many departments of literature, competing with, and approaching closely to, the class of productions emanating from houses conducted by private enterprise.

Trade, BOARD OF, a department of government more correctly designed 'The Lords of the Committee of Her Majesty's Privy-council appointed for the Consideration of all Matters relating to Trade and Foreign Plantations.' In 1660 Charles II. created two separate councils for Trade and for Foreign Plantations, which in 1672 were consolidated into one. The Board of Trade and Plantations, after being abolished in 1675, and reappointed in 1695, was again abolished in 1782. In 1786 the presently existing department was established by Order in Council, being a permanent committee of Privy-council for the consideration of all matters relating to Trade and the Colonies. The board consists of a president, together with the Lord Chancellor, the Archbishop of Canterbury, the First Lord of the Treasury, the principal Secretaries of State, the Chancellor of the Exchequer, the Speaker of the House of Commons, and others. But of the latter *ex officio* members none take part in the work of the board, which is managed by the president and his staff; the staff includes the permanent and parliamentary secretaries, four assistant secretaries, and a chief of the statistical department. The board is now divided into five departments: (1) the statistical and commercial department, (2) the railway department, (3) the marine department, (4) the harbour department, and (5) a financial department. Since 1864 the presidentship has always been held by a cabinet minister. Before 1867 there was a vice-president who was a member of the administration, though without a seat in the cabinet.

The functions of the Board of Trade are partly of a ministerial, partly of a judicial kind, and have of late years been greatly enlarged by a variety of statutes. The board is charged with the general superintendence of all matters relating to the mercantile marine. It requires and considers reports made to its inspectors and other officers, and orders returns of various kinds regarding trade and navigation. It is empowered to make regulations regarding the examination and qualifications of applicants for the position of master or mate of passenger-ships. Under the Merchant Shipping Act, 1854, it grants licenses to persons to engage or supply seamen or apprentices for merchant-ships, decides on claims for wages, and investigates charges of misconduct and incompetency. It also appoints officers to inquire into and report on the condition of steam-vessels.

The supervision of railways and railway companies, both as to their original formation and their working, constitutes an important part of the duties of the Board of Trade. Railways were first subjected to government control by an act of 1840 which conferred power on the Board of Trade to appoint inspectors of railways, to approve or disallow bylaws, to require returns of traffic, and to decide disputes between connecting lines. Further powers have been added by subsequent acts. In 1846 the increase of these duties, arising from the rapid extension of railways, led to the transfer of this department of the Board of Trade to a separate board created exclusively for the management of railway business; but in 1851 this latter board was abolished, and its powers were retransferred to the Board of Trade. Notices of applications for railway acts with plans are required to be deposited with the board before any bill can be introduced into parliament; and before any railway can be opened for traffic the permission of the board must be obtained on the report of an inspector. On the occurrence of an accident notice must be given to the board, which sends an inspector to inquire into the circumstances, and on his report the board is empowered to take what steps are judged necessary for the security of the public.

Many matters relating to the interests of trade which come before other departments are referred to the Board of Trade for information or advice. Thus there are frequent communications with the Foreign Office regarding the negotiation and working of commercial treaties, and with the Treasury regarding alterations in the customs.

A statistical department of the board was established in 1832, whose province is to collect and publish tables containing classified information regarding the revenues, population, commerce, wealth, and moral and economical condition of the United Kingdom and its dependencies, to prepare a selection from the statistics of foreign countries, and a monthly account of trade and navigation. All applications made to the Queen in Council by companies or private persons for charters of incorporation are referred to the Board of Trade; and among the functions committed to it by statute are the registration of joint-stock companies and copyright designs, and the supervision of proceedings under the Bankruptcy Act, 1883. The board is empowered by several local and personal acts to control the proceedings of the commissioners for regulating the employment of coal-whippers and the discharge of coal-laden vessels in the port of London. In 1853 the Department of Science and Art, which owed its origin to suggestions made in the Second Report of the Commissioners for the Exhibition of 1851, and was at first a department of the Committee of the Privy-council on Education, was placed under the control of the Board of Trade; but in February 1856 it was retransferred by an Order in Council to the Education Department. Since 1886 the department issues monthly the valuable *Board of Trade Journal*, containing extracts from consular reports, customs regulations and changes of tariff, a report on the state of the skilled labour market, and much information of value to the mercantile community.

Trade Corporations. See CORPORATION, COMPANY, GUILDS, LIVERY.

Trade-marks. A trade-mark is the name or mark under which any one trades. It is a mode of connecting certain goods in the mind of the public with a particular manufacturer or seller; and its function is to give to a purchaser a satisfactory

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assurance of the make and quality of the article he is buying. A trade-mark is the property of the person legally adopting it, and he has a right —antecedent to and independent of the various trade-mark acts—to prevent any one else from using it to his prejudice.

Water-marks on paper, dating from the 14th century, are among the oldest trade-marks. Trade-marks appear to have become a prominent feature in the industrial life of England in the early part of the 18th century. The law relating to them has pursued the following course of development. (1) At first no *right of property* in a trade-mark was recognised, and only the *actual, fraudulent, and injurious* use by one person of the mark of another was restrained and punished. This rule, which originally prevailed both at common law and in equity, was inspired by the old judicial dislike of patent privileges and the failure to see the essential difference between a patent and a trade-mark. (2) In 1838, however, in the case of Millington *v.* Fox (3 My. and Cr. 338) Lord Chancellor Cottenham granted a perpetual injunction against the defendant, although no intentional fraud was established. Since that time the Court of Chancery has uniformly interfered to prevent the infringement of trade-marks on the principle of protecting property alone, and it has not been necessary for the plaintiff to prove that the defendant invaded his rights intentionally. (3) The Courts of Common Law did not imitate the wise liberality of the Court of Chancery, and down to 1873 proof of fraud on the part of an infringer was of the essence of a common-law action for damages. The Judicature Act of 1873 provided, however, that in any conflict between the rules of law and of equity the latter should thenceforth prevail; and if actions of infringement were still tried in the Queen's Bench Division, there can be little doubt that the equitable rule would be applied, and proof of fraud dispensed with. (4) But under the judicature acts and the rules of the supreme court trade-mark cases are brought in the Chancery division, so that the former variance between the Courts of Common Law and the Court of Chancery has now only a historic interest and importance. The owner of a trade-mark that is being infringed usually applies for an *interlocutory* injunction to restrain the immediate infringement, and at the same time brings an action in which he claims (*a*) a *perpetual* injunction, and (*b*) an account of the profits made by the infringer, or damages in lieu thereof. The fraudulent imitator of a trade-mark may be indicted for false pretences, but not for forgery. See, however, Merchandise Marks (*infra*).

The Registration of Trade-marks.—At common law a trade-mark could be acquired only by actual user; it must have been 'so applied in the market as to indicate to purchasers that the goods to which it was attached were the manufacture of a particular firm.' By the Trade-marks Registration Act, 1875, a Register of Trade-marks was established at the Office of the Commissioner of Patents (now the Patent Office), and it was provided that the registration of a trade-mark should thenceforth be equivalent to public user. This provision is in substance repeated in the Patents Acts, 1883–88, by which the registration of trade-marks is now regulated. The registration of a person as proprietor of a trade-mark is *primâ facie*, and after five years is conclusive, evidence of his right to the exclusive use of the said mark (subject to the provisions of the acts); and no person can institute proceedings for infringement unless the mark alleged to be infringed has been registered, or—in the case of marks in use prior to the Act of 1875—has been declared by the certificate of the Comptroller-general to be non-registrable. For the purposes of the acts a trade-mark must contain at least one of the following essential particulars: (*a*) a name of an individual or firm printed, impressed, or woven in some particular and distinctive manner; or (*b*) a written signature or copy of a written signature of the individual or firm applying for registration thereof as a trade-mark; or (*c*) a distinctive device, mark, brand, heading, label, or ticket; or (*d*) an invented word or words; or (*e*) a word or words having no reference to the character or quality of the goods, and not being a geographical name. There may be added to any one or more of these 'essential particulars' any letters, words, or figures, or combination thereof; but the applicant for registration of any such additional matter must in his application state the essential particulars of his trade-mark and disclaim any right to the exclusive use of the added matter. But a person need not disclaim his own name or the foreign equivalent thereof; and any special and distinctive word or words, letter, figure, or combination thereof used *separately* and as a trade-mark prior to the Act of 1875 is still registrable. A trade-mark when registered may be assigned and transmitted, but only in connection with the goodwill of the business concerned in the particular goods or classes of goods for which it has been registered, and is determinable with that goodwill. The provisions for the rectification of the Register noticed in the article PATENTS apply *mutatis mutandis* to trade-marks. The 'International Convention for the Protection of Industrial Property'—the history of which is given in the same article—also extends to trade-marks. Under that convention an applicant for registration of a trade-mark in any one of the contracting states may obtain protection in any of the other contracting states by application there within three or, in the case of countries beyond the seas, four months from the date of the first application. The subsequent application is antedated to the date of the first, and is consequently not defeated as otherwise it might have been by prior user in the protected interval. In the United States there is a good deal of difference between the laws of the various states on this subject.

Merchandise Marks.—Under the Merchandise Marks Act, 1887, which applies to England, Scotland, and Ireland, every person that (*a*) forges, (*b*) falsely applies to goods, (*c*) makes, disposes of, or has in his possession any instrument for forging any trade-mark, or (*d*) applies any false trade description to goods is liable, on conviction on indictment, to a maximum period of two years' imprisonment, and on summary conviction to a maximum term of four months' imprisonment with hard labour, or a fine of £20, for the first offence, and in the case of a second or subsequent offence to a term not exceeding six months with hard labour, or a fine of £50. Any person aggrieved by the decision of a court of summary jurisdiction may appeal to quarter sessions. It is a competent defence to a prosecution under the act that the defendant took all reasonable precautions against committing the offence, and gave on demand by, or on behalf of, the prosecutor all the information in his power, or otherwise acted innocently. The limitation for proceedings under this act is the expiration of the three years next after the commission, or the one year next after the discovery of the alleged offence, whichever shall first happen. A conviction under this act does not relieve the defendant from liability to *civil* proceedings.

See works by W. H. Browne (2d ed. Boston, 1885), R. S. Mushet (1885), L. B. Sebastian (3d ed. 1890), J. S. Salaman (1891); and Lawson on the Patents, Designs, and Trade Marks Acts (Patent Office Inquiry, 1887).

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Trade Protection Societies are associations composed of merchants, tradesmen, and others, which have been formed for the promotion of trade and for protecting the individual members from losses in their business transactions; one of the earliest being the 'London Association of Guardians for the Protection of Trade,' established in 1776. In 1871 the Board of Trade granted a license for incorporation to one under the Companies Acts, 1862–67. The operations of these societies used to be confined chiefly to the compilation of registers of bankruptcies, insolvencies, and private settlements with creditors. Each member informed the secretary of the name, occupation, and address of the customers who became insolvent, with the amount of dividend their estate yielded; and latterly, whether the insolvency was due to recklessness and extravagance, or was innocent misfortune. Special attention was directed to the exposure of swindlers and persons who had been guilty of fraud or embezzlement. The information accumulated in the registers, though always accessible to such members as made inquiry at the offices of the society, was kept strictly private from all others. But the extraordinary development of commercial enterprise which took place in the early part of the 19th century added a new stimulus to the trade protection movement. The registers which the societies now printed and circulated among their members contained transcriptions from the following public records—viz. the records of the bankruptcy courts, registers of assignments and trust-deeds, bonds or warrants of attorney, bills of sale, judges' orders, protested bills, and decrees in absence. The societies also undertook to recover past-due bills and accounts for their members, to investigate the circumstances connected with bankruptcies and insolvencies, collect dividends, and perform the general agency business of their members—the whole being done under the direction of a committee appointed for this purpose. Committees were also appointed to scrutinise all measures affecting trade and commerce which might be introduced into parliament, and to promote legislation favourable to the commercial interest. The sphere of action of trade protection societies thus rapidly widened. The older societies established offices and branches throughout the country; new societies sprang up in the large provincial cities, which in their turn opened agencies and branches in other towns and villages; and the various societies being in communication, the machinery of the whole is available for the purposes of each. In 1852 the various societies formed themselves into an association, which now includes upwards of sixty societies. An annual meeting of delegates from all these is held in London, at which matters affecting trade are discussed.

Tradescantia, a genus of American perennial herbs, differing much in habit, which comprises some thirty-two species, four belonging to the United States, and some tropical. The flowers are loosely or densely panicled, and resemble umbels. *T. virginica* is often cultivated in gardens, and *T. discolor*, a white-flowered evergreen, under glass. The genus was named after John Tradescant, gardener to Charles I., who died in 1638.

Trade Unions, or TRADES UNIONS. It is now almost universally admitted that trade unions are the lineal descendants of, and the legitimate successors to, the old English guilds, more especially in their latest development, that of craft Guilds (q.v.). History is almost silent as regards the guild system from the time of the suppression of the guilds, in the reign of Henry VIII., until the later attempts of the handicraftsmen in the 18th century to establish trade customs having the force of law, and to enforce the provisions of the Statute of Apprentices, which in a sense was a kind of codification of the then existing guild law, as formulated in the Ordinances of the Guilds, and held to be binding in nearly all trades. Those ordinances were kept alive in various ways, sometimes by charters granted in the reign of the Stuarts, as in London, at Exeter, Norwich, and other towns, where manufactures were carried on, and at Berwick-on-Tweed and other places where, with or without a charter, the old system was recognised and applied to existing industries. Trade unions arose out of the contests, legal and otherwise, to enforce the trade customs established by the guilds, and the provisions of the Statute of Apprentices, 5 Eliz. 4, and of other statutes subsequently passed and in force. In the newer industrial developments of the 17th century, and their fuller expansion in the 18th, some of those provisions were regarded by employers as being in restraint of trade, and they tried to evade them, or to ignore them. The workmen endeavoured to maintain and enforce them; hence arose 'combinations,' mostly of a temporary character in the first instance, to protect the interests of the workmen, and exact obedience to the law. By degrees those combinations became more and more permanent, until, towards the end of the 18th century, the trade union was instituted in a more or less crude form, but similar in most respects to those now in existence. Among the earliest complete types of a trade union is perhaps the 'Institution,' established by the cloth-workers of Halifax in the year 1796; but others had existed at a much earlier date.

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The earlier history of trade unions is one long record of repression. Amongst other things inherited from their predecessors the guilds was the suspicion that they were opposed to public policy; they were regarded as combinations in restraint of trade, as the supporters of industrial monopoly, and as dangerous associations which ought to be suppressed. The Combination Laws were passed to prohibit them, and other laws were resorted to for the purpose of destroying their power. Perhaps the very persecution to which they were subjected helped to give them permanency as an institution in the land. This policy was reversed in 1824, and by the amending Act of 1825, by the repeal of the Combination Laws. But the then legal recognition did not afford to them legal protection. It was not until 1869 that they obtained protection for their funds and property by a temporary act, and only permanently in 1871 by the Trade Union Act. Since that date other acts have placed them upon a footing of equality with other voluntary associations in the country.

In the first twenty years of the 19th century many trade societies were formed, some few of which have survived to this day. The earliest survivors date from about the year 1809, but they have undergone changes in constitution, if not much in their aims. So active were those unions in the years 1818, 1819, and 1820, that inquiries were instituted into their constitution and operations, which inquiries paved the way for the ultimate repeal of the Combination Laws, the prosecutions which had taken place helping rather than retarding the movement for repeal. The unions were extremely active from 1824 to 1838, when a further inquiry was instituted. They were most active in 1833 and 1834, and again in 1847 and 1848. In the year 1850 a new departure commenced by the formation of the Amalgamated Society of Engineers, one of the most perfect types of a trade union in the world.

In their essential character trade unions are

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voluntary associations of workmen for mutual protection and assistance in securing generally the most favourable conditions of labour for their members. Voluntary they must of necessity be, for the freedom to combine implies also the freedom not to combine. Within certain lines the law limits and defines what may and what may not be done, in furtherance of the objects of a trade union. Briefly stated, the position is this: Neither employer nor workman has the right to compel another person to do, or abstain from doing, that which he deems best for his own advantage. Formerly a trade unionist was liable to prosecution and punishment for doing certain things that another person, not in a trade union, might do. Now the law is fairly equal as between man and man, irrespective of his belonging or not belonging to a trade union.

The main object of a trade union is the securing of the most favourable conditions of labour in the particular trade it represents. This fundamental object includes all efforts to raise wages, and to maintain wages at the highest possible level in the trade; the reduction of the hours of labour, and resistance to any increase in those hours; and also the regulation of apprentices, overtime, piecework, methods of employment or discharge, and modes of working generally. All those objects are now lawful, provided that the means adopted to enforce them are legal; formerly they were all regarded as unlawful, being in restraint of trade, a doctrine rendered obsolete by the Acts of 1875.

The constitution of a trade union is essentially democratic. The members are bound by a code of rules presented to each of them on being admitted as members. Those rules are revised from time to time by the votes of the members, either by a plebiscite or through delegates, popularly elected, by the votes of members, by ballot or in open lodge. The old notion of bylaws other than the rules is now exploded. A large proportion of the unions are now registered, a process which would render bylaws illegal were they of the character formerly supposed. The bylaws are merely lodge regulations for the conduct of business, of no public concern whatever.

Opinions differ widely as to some of the trade objects of trade unions, especially as to apprentices, overtime, piecework, and the like. The apprenticeship system is abandoned in many trades, in so far as admission to the union is concerned. In some unions, however, the system prevails, the ostensible object being to secure good handicraftsmen; but there can be little doubt that it is intended, as was intended by the Ordinances of the Guilds and by the act of Elizabeth, to limit the number of workers at the particular trade. As to overtime, opinions have greatly changed of late, the general feeling being in favour of restriction in that respect. As to piecework, it is as much in favour in some trades as it is repugnant to the workers in others; the adoption of it is regulated mainly by the nature of the employment. In some industries it is the universal practice, in others it is only partially resorted to, in others it is deemed to be inapplicable. The union regulates time-wages in the one case and piece-rates in the other, either by a scale, a log, or a price-list. With respect to the hours of labour the uniform action of the unions is in favour of shorter hours, according to the trade. Only since 1887 has any demand sprung up for an equal day of eight hours for all workers, a demand not seriously entertained by the majority.

These and other objects are termed the trade purposes of the union. In practice they vary in their application to the particular trade. In some the question of apprentices never crops up; it is inapplicable at the present time, whatever it might have been formerly. Overtime mainly pertains to day-workers, though long hours apply equally to piece-workers; but shorter hours, when obtained, apply alike to all, though the modes of apportionment may differ. The work of a trade union which has to regulate a price-list, or maintain a scale, is often of a most laborious and minute character, as in the tailoring trade, in the boot and shoe trades, and more especially in the textile trades, the latter requiring experts of a high character to be able to work out the 'statements.' In all cases the object is to maintain the standard of wages at the highest level possible, making such advances as the conditions of trade will permit, and resisting reductions where the members and their officials deem it expedient to do so.

Generally speaking, the means by which trade unions seek to attain their objects is strikes. Formerly this was the only means; but the growth of the unions, their recognition by law, and the diminution of the prejudices which existed against them, have enabled the officials and the executives of the associations to approach employers by boards of conciliation and arbitration, thereby averting strikes. Moreover a system of self-adjusting sliding scales has been devised, especially in the iron and steel and coal trades, by means of which the rates of wages vary with the price of the material, rising or falling as prices advance or recede. In such cases there is a minimum wage fixed as a basis, the percentage being arranged according to certain customs in the trade. In the event of a strike it is usual to recognize trade customs, such as giving notices where notices are required; the union that sanctioned a strike without giving such notices would gain little sympathy and no support from other unions if appealed to for help—unless indeed there were very strong and urgent reasons for not doing so. In cases of arbitration it is extremely rare for any union to contest the award of the arbitrator, although there have been instances of the kind. They are, however, so few in number, compared with loyal acceptance, even when the award is against the men, that it is unfair to allege that the unions do not loyally abide by the decision of an umpire as a general rule. It was at one time usually urged that the cost of a contest was greater than the advantages that could possibly accrue, even if successful. This position is untenable; and were it true, as alleged, men would soon cease to strike. Strikes are indeed most costly, and they usually involve a large amount of suffering and privation, but on the whole the balance of profit is with the aggregate men of the trade, even if it be sometimes at the cost of the strikers. The reasons are obvious. The battle is fought by a few, the many share the advantages, whatever they may be. Strikes are deplorable, and there is a growing disposition to avoid them as much as possible, though passion gets the better of reason sometimes, and disputes occur where they might have been averted.

The growth of trade unionism is a feature of the times in which we live. Only a very few years ago trade unions were tabooed by all sorts and conditions of men, other than the men in such trades who had experienced the advantages of such unions. A large proportion even of those fought shy of them. Now they are quite fashionable; they are commended in the senate, in the pulpit, from the platform, and in the press, until the workers begin to feel a sense of shame in not belonging to one. Even clerks and civil servants, who used to deride them, have some kind of association for mutual protection. They are spreading and extending in all directions. They have been recommended by a committee of the House of Lords as the best mode of dealing with 'Sweating' (q.v.). It is

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certainly no longer a reproach to belong to a trade union, for their trusted officers are members of parliament, have had, and have, seats on royal commissions, have been accredited as British representatives at an imperial congress, have been entertained by the heir-apparent to the crown, and fill posts of honour in many of the local institutions of the land.

It is not quite so easy to accurately describe the actual increase of membership, because no absolutely reliable record exists of their real numerical strength throughout the country at given dates. The Registrar's returns will not furnish the figures for the simple reason that all the unions are not registered, and some that are do not always send in returns. Nevertheless the gradual growth since 1871 is indicated by the increase in membership of the registered societies that regularly make returns as to the number of members, income and expenditure, and the amount of funds. At the close of 1872, the first full year of registration, the total number of registered trade unions was 73, with 217,128 members; in 1891 there were 490 registered societies, with a total of 645,451 in the 235 societies sending in returns. In Scotland only 1 society failed to make returns, in Ireland 13, and in England and Wales 241 failed to comply. It is estimated that there are about 2000 trade societies in the United Kingdom, with a total membership of nearly 2,250,000, and having an aggregate balance in hand of about 2 millions sterling, the annual income being nearly equal to that amount. The weekly contributions of members vary according to the objects included in the society's rules. In trade unions established for trade purposes only the contributions range from 2d. or 3d. per week to 6d. per week, with from 3d. to 6d. per quarter for local objects or branch expenses. In the unions having provident benefits as well as trade purposes, the contributions range from 6d. to 1s. per week, the small quarterly payments being a trifle higher in most instances. These regular payments are exclusive of levies, special and general, sometimes amounting to a total sum equalling a year's contribution. But this is exceptional. The total payments by the members of the Amalgamated Society of Engineers, and some other unions similarly constituted and with like benefits, amount to quite £3 per annum, often more. The average amount per member in the total of the registered societies making returns amounted in one year to £2, 2s. 9d., and that year was not the worst for trade; but the average of the aggregate societies would not, as a rule, greatly exceed £1 per member. The average over ten years for all the registered societies making returns was £1, 3s. 5d. per member.

The principal difference between one trade union and another is to be found in the benefits provided for the members under the rules. There is no essential difference in constitution and aims. All have for their primary object 'trade protection,' and consequently provide strike-pay. A few, and more particularly some of the new unions, make no further provision. But the vast majority of those established for trade purposes only provide 'funeral allowance,' a provision directly inherited from the old guild system. The most perfect types of the modern trade union are those which provide what are called 'provident benefits,' such as weekly payments to members out of work, during sickness, and superannuation in old age; accident benefit, in cases of partial or total disablement; funeral allowance, in case of death of member or his wife, and, in some cases, insurance against loss of tools, and benevolent grants in times of acute distress; all of which benefits are in addition to, not in lieu of, strike-pay. The amounts payable under these several heads vary considerably—from 8s. to 12s. per week to members out of work; from 9s. to 15s. per week in sickness; from 5s. to 10s. per week superannuation; from £6 to £15 in case of death; from £50 to £100 in cases of accident; from £5 to £10 loss of tools by fire, &c., and from 10s. to 25s. per week in cases of strikes. The latter amounts are often increased by special levies, or by the voluntary contributions of other societies, or by public subscriptions.

The advantages conferred upon the members of societies making such provident provisions are so enormous that the wonder is that all trade unions have not made similar provision, at least to the extent of ability of the members to contribute such sums as will assure the benefits. It is the provident side of trade unions that has reconciled the public to their legal recognition, and has enabled the legislature to legalise and protect them. The extent of those benefits, and their far-reaching effects, are evidenced by the fact that in forty years thirteen societies have paid in provident benefits alone to their members £7,460,071, while the total strike-pay by the same societies during the same period amounted only to £481,816. Yet those societies are pre-eminently the unions that have secured and maintained for their members the highest rates of wages, the shortest hours of labour, and the best conditions of employment enjoyed by any industrial workers in the country. The total income in 1890 exceeded £550,000 for the thirteen societies, and their expenditure exceeded £500,000; nevertheless the total balance in hand exceeded £750,000. The staying power of such unions is immense, for the whole aggregate funds may be used in a labour struggle in case of need. There is, however, very slight prospect of such vast expenditure being required, as the moral and material force of such large accumulations exercises a potent influence in preventing and averting strikes.

The economical effect of those benefits and of the accumulated funds for their sustenance is great beyond all question. Hunger competition is averted because the members are supported when out of work, during sickness, and in old age. Starvation wages are not possible in such cases; the only question is what standard of living shall the members aspire to and endeavour to attain. Prudence is inculcated in this connection, for the members will hesitate to run inordinate risks, however tempted to do so. Strikes are fewer in those societies than formerly, albeit they are stern and stubborn when they occur. The history of such unions is one of continuous progress, in numbers, in resources, and in influence. Other societies have maintained their ground in numerous instances, but not progressively in the same ratio Many have collapsed, revived again, and once more collapsed; but in no case have the provident unions failed to keep their engagements with their members, although in a few they have undergone an immense strain in times of trade depression.

As before stated, there is really no essential difference between the old and the new trade unionism. The new unions are formed mainly on the old lines, and many are verging more and more towards the best modern type. The newer unions were in the first instance constituted as societies for trade purposes only, thus going back to the earlier and simpler forms of industrial organisation. Their leaders rather ostentatiously declared that they were 'fighting machines,' and sneered at the 'huge benefit clubs,' as they termed the Amalgamated Society of Engineers and similar associations. Already some of these new unions have introduced funeral benefits, a few superannuation allowance, others accident benefit, but none of them either out-of-work or sick benefits. In their modes of action the newer unions have been more aggressive,

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less tolerant of opposition, more inclined to use force or compulsion as regards non-unionists, and they are also rather more reckless in the initiation of strikes. This was inevitable, for a strike is the *raison d'être* of a union that is merely a fighting machine. In times of industrial excitement and disputes men will readily subscribe and vote money from a sentiment of *esprit de corps*, being impelled by the action of others, by the enthusiasm engendered, and the pressure brought to bear. These incitements over, the influences removed, the battle lost or won as the case may be, the fervour is gone, apathy sets in, and the contributions fall away. There are not the same impelling forces at work as in the provident unions—where the motive and incentive to continuous contributions are operating without cessation, because of the permanent benefits in store for each individual member. Federation is advocated and resorted to, as supplying an incentive and impelling force, instead of provident benefits. But a federation of weak unions cannot be a substitute for effective organisation in individual cases, though they may, and often do afford additional strength in cases of labour disputes. But the strength thus obtained is temporary and not permanent, except in special cases, inasmuch as diversified interests crop up and divide, in which event they rather act as a solvent and tend to disintegrate where they were intended to unite. The new unionists also rely more upon possible legislation for labour than the older unionists.

Trade unions are no longer under the ban of the law. Their action is approved by living political economists. Their influence is felt, and their intervention is recognised by all classes of society, by the state, by employers, and by the general public. Differences of opinion exist as to the methods and the means, and also the objects in some instances. If well organised, wisely directed, and powerful by reason of membership and resources, they command attention, and are able to equalise the conditions of labour in the manner suggested by Adam Smith. They protect their members by placing them in a position to exact mutuality in all labour contracts, instead of being compelled to agree to terms which hunger might lead them to accept. The present conditions of labour in Britain furnish incontestable proofs of their useful work, whatever may be said of their action in particular instances. But the full measure of their worth, as industrial organisations, is only to be seen in the operation of their provident benefits. In this respect the better class of trade unions are absolutely unique. They keep their own poor, succour and support their own sick, provide for the aged and infirm, bury their own dead, and render important assistance in cases of accident, adversity, loss of tools, and other ills that especially fall to the lot of the poor. They do this without the taint of pauperism, thus preserving the self-respect of the members and of their families. At the same time they pay all local rates and taxes like other citizens, laying claim to no exemption in this respect. They also afford assistance, often of a generous character, to other similar bodies of men or associations in cases of need. Their influence is also very largely educational, they inculcate thrift, they promote sobriety, they discourage profanity and bad language, and they teach and enforce discipline, order, and obedience to law. Their growth recently has been phenomenal; the engineers boast of nearly 72,000 members, the income in 1890 being nearly £184,000. Many other unions have from 20,000 to over 40,000 members, with a yearly income proportionate to their numbers. Both the numerical strength and the large financial resources involve corresponding duties and responsibilities. Equal conditions imply full powers of negotiation between employers and employed. The hopeful prospect, therefore, is that strikes and lockouts will be resorted to less frequently, and that conciliation and arbitration will be applied to all labour disputes.

Comparatively little progress has been made in the institution of trade unions on the continent of Europe, but some progress is now being made. Up to a recent date the associations were political rather than industrial; in England it is the reverse. The effect of the international labour congresses has been to familiarise the workmen of Germany, France, Belgium, Holland, Austria, Italy, Switzerland, and even Spain, with the essential principles of industrial organisation, and some excellent types of the modern trade union have been established. What is now required is that there shall be freedom to combine in all countries as in England.

In the United States there are labour organisations, such as the Knights of Labor (q.v.), &c., but the trade unions are not equal to those in England in any respect. The best unions in the States are the branches of the Amalgamated Society of Engineers, the Carpenters and Joiners, and a few others. The American unions rather favour the secret order system in their organisations.

In the British colonies the best unions are in the Australian colonies, in some of which excellent unions exist. Here the engineers and the joiners have been the chief pioneers. But the Australians are far ahead of all other colonies, and even of the United States, in industrial organisation, the unions being modelled after those in England, usually those of the best type.

See the articles GUILDS and works there cited, FACTORY ACTS, FRIENDLY SOCIETIES, and LIABILITY OF EMPLOYERS; Comte de Paris, *The Trades Unions of England* (trans. 1869); Thurlow, *Trades Unions Abroad* (1871); Lord Brassey, *Work and Wages*, and other works on the labour question (1872–80); Stanley Jevons, *The State in Relation to Labour* (1882); Thorold Rogers, *Six Centuries of Work and Wages* (1884); Brentam, *The Relation of Labour to the Law of To-day* (New York, 1891); *Handy Book of the Labour Question* (1876); *Conflicts of Capital and Labour* (1878; 2d ed. 1890); *Trade Unionism New and Old* (1891), by the present writer; 'Trade Unions,' 'Strikes and Lockouts,' 'Rates of Wages, &c.,' and returns and publications of the Labour Bureau established in 1866; Reports of Committees on combination of workmen, sweating, and of the Royal Commission on Trade Unions (1867–69), and of the Labour Commission (1891–92).

Trade-winds. See WINDS.

Tradition. See ROMAN CATHOLIC CHURCH, NEWMAN.

Traducianism. See PRE-EXISTENCE.

Trafalgar', CAPE, a low promontory on the south coast of Spain, about 29 miles west-north-west of Tarifa (q.v.), on the Straits of Gibraltar. It is memorable for the great naval victory obtained (October 21, 1805) by the British fleet under Nelson over the combined fleets of France and Spain under the French Admiral Villeneuve and two Spanish admirals. The British force consisted of 27 sail of the line, 4 frigates, 1 schooner, and 1 cutter; the force of the French and Spaniards united amounted to 33 sail of the line, 5 frigates, and 2 brigs. Villeneuve formed his fleet in a double line in close order, Nelson attacked in two lines, Collingwood leading the first. His own ship, the *Victory*, ran on the *Redoutable* with the intention of breaking the line, and soon forced her to strike, but not before Nelson had been mortally wounded by the fire kept up from her tops. Nelson lived long enough to know that twenty of the

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enemy had struck. The English loss was 1587 men. See NELSON; and Professor Laughton's *Story of Trafalgar* (1890).

Tragacanth (Gr., 'goat-thorn'), a name given to several low spiny shrubs of the genus Astragalus (*A. gummifer*, *A. microcephalus*, &c.), found in western Asia, and to the mucilaginous substance or gum derived from them—for which see GUM.

Tragedy. See DRAMA.

Tragopan (*Ceriornis*), a genus of birds in the Pheasant family, represented by five species in India and China. They are birds of very beautiful plumage, of the most brilliant reds, browns, buffs, and lustrous blacks. There is an erectile fleshy horn on each side of the head, and a loose wattle,

Tragopan, or Horned Pheasant (*Ceriornis satyra*).

capable of being inflated, lies like an apron on the throat. The best-known species are the Indian Crimson Tragopan (*C. satyra*) and the Black-headed Tragopan (*C. melanocephala*), inhabiting the forests on high ranges. In courtship the male 'shows off' his beauty in an elaborate way before his desired mate. The other species are *C. blythii* from Upper Assam, *C. caboti* from south-west China, and *C. temminckii* from central China. The tragopans are capable of acclimatisation, and possibly domestication, in Britain.

Train-bands. See MILITIA, Vol. VII. p. 192.

Training, in the wider sense equal to practical education in any profession, art, or handicraft, is frequently used in the specific sense of the method adopted by athletes for developing their physical strength, endurance, or dexterity, or to qualify them for victory in competitive trials of skill, races, matches, &c. Training in this sense consists mainly in bodily exercise, both general and specially adapted to the particular sport in view (as for running, rowing, boxing, &c.), and in sufficient and carefully regulated dieting. General exercising has been already considered at ATHLETICS and GYMNASTICS. The special training for boat-races, and the dieting suitable to all athletes are sufficiently dealt with at ROWING, Vol. IX. p. 10. Training may be overdone, to the serious and even permanent detriment of health. See Maclaren's *Training in Theory and Practice* (2d ed. 1874).

Training-colleges. See EDUCATION, Vol. IV. pp. 211–217.

Trajan. MARCUS ULPIUS TRAJANUS, Roman emperor, was born at Italica (near Seville) about 56. He was descended from a family which was probably of Roman origin, was early trained to arms, and gaining distinction in the Parthian and German campaigns was made prætor and consul (91), and was adopted (97) by Nerva as his colleague and successor. He became sole ruler in the following year. In 101 Rome for the first time beheld its emperor leading forth his legions in person on a career of conquest, when Trajan set out on his first campaign against the Dacians. The struggle was long and fierce; the emperor's opponents were valiant warriors, and headed by an able leader, their monarch, Decebalus; but the Romans at last gained a decisive superiority, and in a subsequent campaign (105) completely subdued their opponents, whose country thenceforth became the Roman province of Dacia, and was secured by partial colonisation. This conquest was celebrated on Trajan's return to Rome by a triumph, and by games on a most extensive scale. In 113 the emperor left Italy for his great expedition in the East, directed mainly against the Parthians. Landing in Syria he made Armenia and Mesopotamia into Roman provinces, and advanced to Ctesiphon on the Tigris, meeting however with actual defeat at Ctesiphon and Hatra. Meanwhile the Jews rose in Cyprus and Cyrene and made fearful massacres; and other enemies took advantage of the emperor's absence in the far east. Trajan took ship for Italy, already in failing health, and was overtaken by death at Selinus in Cilicia, August 117. Though most of Trajan's reign was spent in the field, the internal administration was carefully and excellently guided; the administration of justice was vigorous and impartial; that of finance was equally admirable; informers (*delatores*) were severely punished, and peculating governors of provinces rigorously prosecuted. The improvement and beautifying of Rome was carried on; the empire was traversed in all directions by new military routes, canals and bridges were constructed, new towns built, the Via Appia was restored, the Pontine Marshes partially drained, the magnificent 'Forum Trajani' erected, and the harbour of Centum Cellæ (Civita Vecchia) constructed. His mildness and moderation were proverbial; and though he persecuted the Christians, it was because he regarded the new religion as distinctly subversive of the state. His famous letter to Pliny (q.v.), then legate in Bithynia and Pontus, shows his character in this regard, and his sincere desire for the comfort and happiness of his subjects is reflected in the customary wish formally uttered on the occasion of an emperor's accession—that he might be 'happier than Augustus, better than Trajan' (*Augusto felicior, Trajano melior*). A popular mediæval legend even described him as saved by the prayers of Pope Gregory I. from the pains of hell. Trajan's Column is described at ROME, Vol. VIII. p. 782. Trajan's Wall is the name given to an old Roman earthwork in the Dobrudja, running from the Danube above Czernavoda to Kustendji on the Black Sea; it is an earthen wall, 8 to 15 feet high, and was defended against the Russians in 1854.

There are works on Trajan by Francke (2d ed. 1840), Dierauer (1868), and De la Berge (1877). See also Merivale, and H. Schiller's *Gesch. der Röm. Kaiserzeit* (Gotha, 1883).

Tralee, a town of County Kerry, on the Lee, about a mile from where it discharges into Tralee Bay, and 207 miles SW. of Dublin by rail. There is a ship-canal to the sea, but the trade of Tralee as a port has decayed since larger ships took to discharging at Fenit, 5 miles along the bay. Tralee returned a member to parliament till 1885. Pop. 9664.

Tram. See SILK, p. 455.

Trammel-net, one of the commonest of the *moored nets* described in the article FISHERIES.

Tramps. See VAGRANTS.

Tramways (Old Swed. *tram*, 'log, wooden sledge'). In the article on Railways (q.v.) the early application of rails for purposes of locomotion was referred to. From very early times

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stone and wood had been used to lessen friction in the traction of heavy weights at quarries and collieries. The first use recorded of iron for this purpose was in 1738, when a 'plate-way' was laid at Whitehaven. Again in 1767 some cast-iron rails were laid in Coalbrookdale, and ten years later a cast-iron 'tramway' was nailed to wooden sleepers in a colliery belonging to the Duke of Norfolk near Sheffield, after the design of John Carr. Fearing a reduction of wages or lessened employment in the future, the labourers employed got up a riot and tore up the road, the inventor having to flee for his life. This 'tramway'—a name said falsely to be derived from one Benjamin Outram belonging to a Derbyshire family—as in other earlier specimens had a flange cast on its outer edge to keep the wheels on the road. It was not until 1789 that the great improvement was made of transferring the flange from the rail to the tire of the wheel, the track then assuming its present form.

In 1801 a tramway 28 miles in length, something of the modern type, was constructed for the Tredegar and Sirhowy ironworks in South Wales, and in the same year a public act was passed for the laying of a line near London from Wandsworth to Croydon. This tramway, which was designed for extension to Reigate, was intended to furnish a more ready means of transport (by horse and mule power) of coal and merchandise from the Thames to the districts south of London. But the undertaking failed to fulfil the hopes of its promoters, and on the discontinuance of its working the greater part of the route was occupied by the Brighton Railway Company.

The rapid development of the locomotive effectually diverted attention in England from the utilisation of rails for the purposes of ordinary street traffic; but as everything that tends to economise labour has for many years past found special favour in the United States, the Americans were not slow to discern the merits which the tramway system offered for the movements of the population. The Fourth Avenue (Harlem) Tramway was chartered in New York in the year 1831, about the time that the Manchester and Liverpool Railway was opened for traffic, but for about twenty years maintained a monopoly of the street railway traffic. A rapid extension of the system then followed, as towns in different parts of the Union increased in size. Philadelphia and Boston established street tramway lines in 1857, and at present every town on the North American Continent of any pretensions to the title—nearly 500 in number—boasts of one or more lines, in many cases worked by electricity. Of a total tramway mileage of over 11,000 about one-half is operated by animal-power, 3000 miles by electricity, 2000 by steam-motors, and 660 by cable.

The reintroduction of tramways into the United Kingdom in 1858–59 was not a successful venture. An enterprising but reckless American (George Francis Train) obtained permission to lay several short lines in different parts of the country. The one first laid down at Birkenhead is still in existence, the more objectionable features of its construction having been modified, but the London lines were all laid down without special parliamentary authority, and their removal was, after a short trial, decreed by the different vestries concerned as a nuisance to existing traffic. The rails were of absurd shape, their projecting flanges making it almost impossible for ordinary vehicles to cross the line except at right angles, and even then at some risk to wheels and springs.

The removal of the toll-bars within the Metropolitan area, following on an agitation commenced in 1864, greatly facilitated the development of tramway enterprise, and in 1869–70 the leading London tramway companies were incorporated. Within about ten years from that date some 500 miles of street railway had been laid in different towns of the United Kingdom, and nearly 1000 miles are now in operation, representing an invested capital of about 13½ millions sterling, and carrying annually 500 to 600 million passengers.

With the development of the tramway system in all parts of the world the question of the relative merits of different forms of tractive power has naturally attracted wide-spread attention with the view of reducing the working cost. The advantages of electricity (see Vol. IV. p. 284) in the concentration of power and increased speed and efficiency, as compared with horseflesh, are generally recognised, and in the United States its use is rapidly superseding animal-power. In Great Britain the objection is more marked to the erection of overhead wires along the streets to convey the electricity to the cars, and in 1892 there were only 26 miles worked by electricity in the United Kingdom. A system which is rapidly growing in favour is that of cable lines. The plan of using a rope or cable as a means of traction is of old date, and various patents have been taken out, something on the lines of the atmospheric railway, for the laying of an underground pipe, in which a rope should travel with a grip attachment on the cars capable of picking up or letting go the travelling cable. The first practical adoption of the idea was made in San Francisco, by a Mr Hallidie, who in 1873 opened the Clay Street cable line. The road in some parts has a gradient of 1 in 6, and rises in its course of about a mile to a height of 300 feet above its low-level terminus. Such a route would be obviously impracticable for a horse-car line, and the success of the new method of traction for steep grades was at once established, and San Francisco has now nearly 100 miles of cable roads in operation. The system was adopted in Chicago ten years later, and was about the same time applied to the working of the Brooklyn Bridge traffic at New York. The application there has been especially successful, the line conveying as many as 35,000 people in an hour between the hours of five and six at night. The trains weigh 72 tons, and travel at about 10 miles an hour.

American engineers were concerned in laying the first cable line in the United Kingdom, that on Highgate Hill, which was opened in 1884, and lines on this system have since been constructed in Edinburgh, where steep gradients exist, and in Birmingham and Bristol. The Brixton route of the London Tramways Company has been converted into a cable line, and in Australia and New Zealand several new cable systems have been laid down.

The figures in cents of the relative cost and working results obtained from the three systems of traction have been compiled by the American Street Railway Association from the statistics of 22 electric lines, 45 horse-car companies, and 10 cable roads as under:

	Electric.	Horse.	Cable.
Expenses per car mile	11·02	24·32	14·12
Interest charges "	3·03	4·62	6·97
Total expenses "	14·05	28·94	21·09

The superior speed to be attained on the electric and cable lines must of course be considered in calculating the capacity and probable returns received from the working of the various systems. The dividend earning powers are thus estimated:

	Electric.	Horse.	Cable.
Investment per mile of street	1·152	1·000	10·486
Miles run annually	1·757	1·000	7·138
Cost per car mile with interest	·485	1·000	·722
Proportionate traffic per street mile to earn 6 per cent.	·852	1·000	5·154

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Taking the horse-car as the unit, the relative results are stated to be as above. It remains to be added that tramway enterprise in any form is a very profitable kind of investment. On the European Continent heavy taxes and subsidies are paid by most of the companies to the municipalities served, and in the United Kingdom, under powers expressly reserved by parliament, it is probable that many of the undertakings will be acquired and worked by the city authorities for the benefit of the ratepayers.

See works on the construction of tramways by Dowson (1875), D. K. Clark (1878), J. Bucknall Smith (1887), and A. W. Wright (Chicago, 1888); also the Parliamentary Returns on Tramways; Sutton and Bennett's *Tramway Acts* (1874; new ed. 1883), and G. L. Phillips, *Tramways Act, 1870; with Introduction, &c.* (1890).

Trance, a morbid sleep, differs from natural repose in duration; in profound insensibility to external impressions; in following excitement and the exaltation of certain instincts, chiefly the religious and amative, rather than fatigue or exhaustion; and in being the concomitant or symptom of diseases of the nervous system, particularly Hysteria (q.v.). It differs on the other hand from Coma (q.v.) in not being associated with serious organic disease, and in the absence of stertorous breathing, muttering, delirium, &c. See SLEEP, INSANITY, CATALEPSY, ECSTASY.

Tranent, a police-burgh of Haddingtonshire, 7½ miles east of Edinburgh. It has a fine school (1877), water-works (1883), and in the churchyard Colonel Gardiner's grave. Coal has been mined here since 1219. Pop. (1851) 2096; (1891) 2389. See P. M'Neil's *Tranent, &c.* (2d ed. 1884).

Trani, a seaport and archiepiscopal city of Southern Italy, 28 miles NW. of Bari by rail, with a 12th-century cathedral, trade in country produce, and a harbour nearly sanded up. Pop. 25,173.

Tranquebar (*Tarangambádi*), a seaport of Madras Presidency, 22 miles N. of Negapatam. A Danish settlement from 1624 to 1807, it passed finally to the English in 1845 for £20,000, and was a busy place till the construction of the South Indian Railway to Negapatam (1861) diverted away its trade. The first Protestant mission to India was established here in 1706. Pop. 6189.

Transcaspian Railway, starting from Uzna Ada on the Caspian, was opened as far as Merv in 1886, to Samarkand in 1888, and in 1892 was being extended to Tashkand. The Amu-Darya (Oxus) is crossed by a wooden bridge 6804 feet in length.

Transcaucasia, the tract of territory belonging to Russia, and extending between the Caucasus (q.v.) on the north and Turkey in Asia and Persia on the south. The provinces on both sides of the Caucasus, with the added Armenian districts, constitute Caucasus or Caucasia in the widest sense, and are under one central authority, with ten minor governments or provinces. But the government is sometimes divided into North Caucasus, Transcaucasia, and Armenia. Transcaucasia comprises seven governments (Kutais, &c.; for which see table at RUSSIA). And see Bryce's *Transcaucasia* (2d ed. 1878).

Transcendentalism. The words transcendental and transcendent (*transcendentalis, transcendens*) were employed by various Schoolmen, in particular Duns Scotus, to describe the conceptions that, by their universality, rise above or transcend the ten Aristotelian Categories (q.v.). Thus, according to Scotus, *Ens*, or Being, because it is predicable of substance and accident alike, of God as well as of the world, is raised above these by including or comprehending them; it has the same relation to the sum of the categories as the *summum genus* to the various genera within a single category. Further, the predicates assumed by Scotus to belong to *Ens*, or simple existence—the One, the True, the Good—are styled transcendent, because applicable to *Ens* before the *descent* is made to the ten classes of real existence.

Between the hitherto convertible terms, transcendental and transcendent, Kant himself drew a distinction of considerable importance for the understanding of his system. By the word 'transcendental' he designates the non-experiential, *a priori* elements of thought (see KANT)—especially the forms and categories (space and time, causality, &c.) which in his view, though they are not products of experience, are manifested only in experience, and contribute an essential element in all experiential knowledge. The word 'transcendent' Kant reserves for those among the transcendental or *a priori* elements that transcend and lie beyond all experience; they may seem to be given in experience, but they are not really given, and are in so far illegitimate as cognitions (though *belief* in them may be attained in other ways). Such are the 'ideas of the pure reason,' God, an immaterial soul, &c.

For post-Kantian systems which affirmed the identity of subject and object the distinction of transcendental and transcendent ceased to exist, and absolute knowledge was practicable; such systems are said to be or contain *transcendentalism*. 'Transcendental Philosophy' was Schelling's own name for an important part of his system (see SCHELLING). Oken and others carried much of this transcendentalism into their *a priori* construction of the nature-philosophy—in which in some cases scientific fact had to yield to speculative deduction. Transcendental has also often been used by 'common-sense' philosophers and the association school for the *a priori* generally. And in vulgar parlance the word applies to what is disapproved of as abstruse, speculative, obscure, fantastic, and as such absurd; it is specially familiar as a criticism of almost any form of idealism. See IDEA.

The epithet of Transcendental School has come, however, to be specially associated with a group of American authors and thinkers, who early in the 19th century led and cherished a wide-spread reaction against time-honoured Puritan prejudices, humdrum orthodoxy, old-fashioned metaphysics, and materialistic philistinism and utilitarianism. The movement was identified with idealism, vague pantheism, mysticism, and eclectic orientalism, and had at times a distinct flavour of the pedantic, the paradoxical, and the extravagant. Among the main exciting causes were the influence of Carlyle and the discovery of the new world of German literature. Brook Farm (q.v.) was one outcome of the school. The first meeting of the Transcendental Club took place in 1836 in the house of George Ripley (q.v.); other conspicuous members of the school were Margaret Fuller and Theodore Parker. Many well-known American authors, such as Hawthorne, have at some time shown affinities that way. But the thinker who most effectively summed up what was best in the movement, gave it the most permanent expression, and secured the widest hearing, was Ralph Waldo Emerson (q.v.). See O. B. Frothingham, *Transcendentalism in New England* (New York, 1876).

Transept. See CHURCH.

Transfiguration, FEAST OF THE, instituted in honour of the Transfiguration of Christ (Matt. xvii. 2), is one of the twelve great feasts which come next after Easter in dignity. In the Anglican Church it is only a Black-letter feast. It is commonly said to have been instituted in the West by Pope Calixtus III. (1455–58), but is mentioned in

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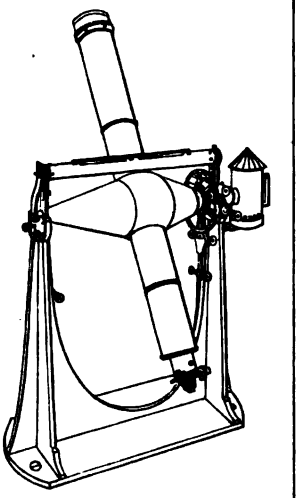
the 9th century. Both Greeks and Westerns keep it on the 6th August.

Transformer. See ELECTRIC LIGHT.

Transfusion of Blood consists in the transference of blood from the veins (or arteries) of a healthy person to one whose blood is so impoverished as to endanger life. The earliest case on record is, so far as we know, that of Pope Innocent VIII., who is said to have been unsuccessfully operated on in April 1492. In 1667 the operation was performed both in France and England, apparently with success; but it again fell into oblivion till 1824, when Dr Blundell, in his *Researches*, proved the feasibility of the process. Since that time it has been regarded as a legitimate operation, and has frequently been successful in apparently hopeless cases; but the difficulties attending it are sufficiently indicated by the number of different procedures and kinds of apparatus devised for its performance. It has been used most frequently and successfully in cases of profuse hæmorrhage after child-birth; but also in many other conditions—e.g. phthisis, puerperal fever, pernicious anæmia, poisoning by agents which destroy the blood-corpuscles or impair their activity. The blood of the lower animals has been shown to be unsuitable for this purpose, and sometimes dangerous. The first requisite, therefore, is to find a healthy person able to spare blood enough for the purpose. Saline solutions, pure water, and milk have been used; the last is strongly recommended by Professor Thomas of New York. But though their mechanical effect is sometimes sufficient to tide over the crisis, they do not supply the deficiency in blood-corpuscles. The chief difficulty in the performance of the operation is the prevention of coagulation of the blood before it reaches the blood-vessels of the patient. This has been surmounted in three ways: (1) by direct transfusion—i.e. rapid transference through a short tube; (2) by the addition of chemical substances which prevent coagulation; (3) by removing the fibrin before injection (see BLOOD). See C. E. Jennings, *Transfusion of Blood and Saline Fluids* (3d ed. 1888).

Transit-instrument, one of the most important of astronomical instruments, consists of a telescope fixed to a horizontal axis, so as to revolve in the plane of the meridian. It is employed, as its name denotes, in the observation of the meridian transits of the heavenly bodies—i.e. the apparent passage of the heavenly bodies across the observer's meridian, an appearance due to the revolution of the earth (for the transits of Venus, see SUN, Vol. IX. p. 803). The axis, which is the most important part of the instrument, and thus demands the utmost care in its construction, consists of a hollow sphere or cube, to opposite sides of which are tightly fastened the bases of two cones in whose apices the pivots are screwed; the sphere or cube is pierced for the admission of the telescope, which is firmly soldered at right angles to the axis. One of the pivots is hollowed so that a stream of light can be directed from a lantern, through an aperture in the side, and half-way along the interior of the axis, into the telescope tube, where, being received by an annular mirror set at 45° to the axis and telescope tube, it is directed to the eyepiece, and brilliantly illumines the field of view, while the annular form of the mirror prevents any interference with the passage of rays from the object under observation to the eye. The pivots must be very carefully turned to a perfectly cylindrical form, and fitted into the instrument, so that their axes are accurately in line. One extremity of the axis carries one and sometimes two small graduated circles, each supplied with index, clamping screws, and vernier; these circles are capable of indicating angular measures to within 1′ or 2′. The pivots rest on massive blocks of stone or other stable material which is little affected by change of temperature, stability being the great mechanical essential of the instrument. This condition satisfied, there are three adjustments necessary before a transit can be observed: the axis must be horizontal; the line of collimation must be at right angles to the axis of motion; and the latter must be placed so as to point accurately east and west. On the perfection of the first two of these adjustments depends whether the telescope sweeps over a great circle of the sphere, and the third is necessary to ensure that this great circle shall be the meridian of the place of observation. These adjustments can never be made quite perfect, and the usual mode is to investigate the amount of error in each, and allow for it in the apparent result. To note accurately the instant of time by the astronomical clock at which the object (e.g. a star) is seen to pass the centre of the field of view is the essential part of a transit observation. The most effective method is to register the beats of the clock by an apparatus which at the end of each oscillation of the pendulum marks a dot upon a uniformly moving slip of paper. This is effected by the agency of electricity, and is one of its most valuable contributions to astronomical science. At a certain point in each oscillation of the pendulum it becomes part of a complete galvanic circuit, the contact being immediately broken by its progression in its oscillation; and it is at these points that the galvanic agency causes the dot to be made. The instant of a transit's occurrence is similarly noted by the observer, who, by a tap on a break-circuit key, fastened to the side of the transit-instrument, causes the graver to make an extra dot; and the distance of this dot from the previous seconds one, compared with the distance between two seconds dots, gives the time accurately almost to $\frac{1}{100}$ of a second. Various ingenious modes of registering have been proposed, all founded on the above principles. It is from the times of transit of the several heavenly bodies thus accurately observed that their right ascensions are determined.



Transit-instrument.

The transit-instrument was invented by Römer about 1690. One was erected in Greenwich Observatory by Halley in 1721; but it was little used till 1742. The transit-instrument there now is by Troughton, and was erected in 1816.

The transit-circle differs mainly from the older transit-instrument in the addition, on the axis of rotation, of two large graduated circles which are read off by microscopes fixed on an independent coaxial wheel called an alidade, any variation in the position of which may be detected by a large spirit-level attached to it. This instrument is as well suited for giving the declinations as for giving transits or right ascensions.

Transition is a term applied to the architectural features of buildings erected at periods intermediate between the fully-developed 'styles'

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technically so called. Thus in Britain there is a transition between the Norman and First Pointed or Early English, another between the First Pointed and the Decorated or Middle Pointed, and a third between the Middle Pointed or Decorated and the Perpendicular. See ARCHITECTURE.

Transkei Territory is a part of the Cape Colony, lying between the Great Kei River (the boundary of British Kaffraria) and the borders of Natal. Covering most of the former Kaffraria proper, it is now divided into Griqualand East, Tembuland, and Transkei in the stricter sense —the latter comprising Fingoland, the Idutwya Reserve, and Galekaland. The last independent portion, Pondoland, was annexed in 1884, but differs from the rest in having a resident commissioner appointed by the Cape government.

Translation, the art of rendering what is written in one language into its corresponding sense in the words of another. Obviously it should first be faithful—a reproduction of the sense and ideas rather than a paraphrase; contrasted with this prime quality all such ends as preserving the colour, the music, the idiomatic vigour, the distinctive manner of the original are counsels of perfection. To translate perfectly is to interpret to the last detail; and to interpret it is necessary to understand. The feeling is more important than the exact word, and the admonition of Dryden may be commended to the adult translator, if not the schoolboy—not 'to lacquey by the side of his author, but to mount up behind him.' It is difficult enough to express one's own meaning to one's wish; doubly difficult is it so to realise another's as to express it as he would have done had ours been his mother-tongue. A literal translation is better than a loose one, but obviously in the case of idioms and metaphors of special meaning the literal rendering cannot be the right one, for in such mechanical transposition the spirit and perfume will be found to have evaporated in the transfusion. 'Translation from one language into other,' said Don Quixote, 'is like looking at Flemish tapestries on the wrong side; for though the figures are visible, they are full of threads that make them indistinct, and they do not show with the smoothness and brightness of the right side. Yet,' he continues, 'a man may employ himself in ways worse and less profitable to himself,' and we need not cut ourselves off from some of the richest springs of human thought and experience because the drinking vessels available are seldom of exquisite workmanship. A prose translation of a poem like the *Iliad* or the *Æneid* can be of course only an approximation to the ideal translation—a shadow of the reality, like the music of the sea, heard but in a shell, the colour being lost, the light and shade altered as in a photograph. Yet such translations as those of the *Odyssey* by Butcher and Lang, the *Iliad* by Leaf, Lang, and Myers, Theocritus by Lang, Sophocles by Jebb, Pindar by Myers, Virgil by Conington or Mackail, the *Inferno* by Dr Carlyle or C. E. Norton, the *Purgatorio* and *Paradiso* by A. J. Butler, are masterpieces of triumph over the difficulties of their kind. Of all books the Bible, or more strictly the New Testament, loses least in translation, the language being itself a product of a degenerate stage of Greek, the ideas to be conveyed relatively direct and simple, the matter being much more heeded than the manner. Fortunately for our literature the English translation was made at a time when the language had reached its period of fullest simplicity and vigour.

To lay down canons of translation will not help much in the matter, for the best translators are those who possess an individuality as well as their originals, such as Edward FitzGerald, whose versions from Calderon and Omar Khayyam, wide of their text as they frequently are, yet succeed to perfection in reviving in a sympathetic English reader the effects produced by the original. Hookham Frere's free versions of Aristophanes are perhaps the best things of their kind that have ever been done. The translation ought to be such that the reader should, if possible, forget that it is a translation at all, and be lulled into the illusion that he is reading an original work. Or again, the translator should retain every peculiarity of the original, so far as he is able, with the greater care the more foreign it may happen to be. Such are some of the more or less perfunctory attempts to lay down definitions of translation, and we need only say in short that this, instead of being the easiest, is one of the most difficult of tasks, only to be essayed by men who are at once masters of both languages and of the subject-matter of the book to be translated. What men thus adequately equipped can make of an ancient author we see when we turn to Jowett's Plato, Munro's Lucretius, Conington's Persius, Long's Marcus Aurelius and Epictetus, Reid's *Academica* and *De Finibus* of Cicero, Church and Brodribb's Tacitus, also the *History* by Albert W. Quill, Rann Kennedy's Demosthenes, Jebb's *Characters* of Theophrastus, Shuckburgh's Polybius, Lewis' Juvenal, Macaulay's Herodotus, Welldon's Aristotle (*Rhetoric* and *Politics*), and the *Ethics* by F. H. Peters, Verrall's Æschylus (*Agamemnon* and *Septem contra Thebas*), Dakyns' Xenophon; or, of English translations from modern languages, the *Thousand and One Nights* of Edward Lane, of John Payne, and of Sir R. Burton; the *Don Quixote* of John Ormsby, and of H. E. Watts; Pascal's *Pensées* by Kegan Paul; Van Laun's Molière; Carlyle's *Wilhelm Meister;* and from the old Icelandic, the 'Saga Library' of Morris and Magnússon. Urquhart's Rabelais, Florio's Montaigne (as well as that by Cotton), North's Amyot's Plutarch, Shelton's *Don Quixote*, Painter's *Palace of Pleasure*, Philemon Holland's Livy, Hobbes's Thucydides; as also such metrical translations as Gavin Douglas' *Æneid*, Harrington's Ariosto, Fairfax's Tasso, belong to a special group in English literature, valued more for their excellent English than for their accuracy. Among modern poetical translations especially notable are Coleridge's *Wallenstein*, Gifford's Juvenal, Cary's Dante, Calverley's Theocritus, Philip Worsley's *Odyssey* and that by William Morris, Plumptre's Æschylus, E. D. A. Morshead's trilogy of Æschylus (the *Agamemnon* better than Milman or Robert Browning), Lewis Campbell's Sophocles, W. H. Pollock's *Nuits* of Alfred de Musset, Lang's *Ballads and Lyrics of Old France*, Rossetti's group of translations from Italian poets entitled 'Dante and his Circle.' The difficulty of translating is well expressed in the punning Italian proverbial saying, that the translator is a betrayer (*Traduttore traditore*). Elphinstone's Martial has the merit of being among the worst, and Dryden's versions of part of Juvenal among the best, of their kind. Horace, the despair of translators, has yet been well treated by Conington and Sir T. Martin; Homer forms a library of itself, famous poetical versions being those by Chapman, Pope, Cowper, and Lord Derby; Chapman preserves the strength of the original, but his fanciful quaintness is a grievous impediment. Pope's *Iliad* is a noble poem, but, as Bentley said with fatal truth, 'you must not call it Homer.' It lacks its naturalness, its flowing simplicity, the Homeric ideas having gained a completely un-Homeric colour in the crucible of a characteristically 18th-century intellect.

There are some excellent remarks on translation by Jowett, in the preface to the third edition (1892) of his Plato.

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Transmigration, or METEMPSYCHOSIS, the transition of the soul after death into another substance or body from what it occupied before—a belief deeply rooted alike in primitive belief and ancient philosophical speculation, and at the present moment widely spread within the range of Brahmanism and Buddhism. It is of course to be carefully distinguished from the metamorphosis of living men, which we find in lycanthropy and witchcraft; it is much wider in its range than the Christian doctrine of the resurrection of the body; and it obviously presupposes a belief in the immortality of the soul, although the ethical conceptions of reward and punishment and of the causal connection between this and a future life are developments of the doctrine unknown, or but rudimentary, at the lower levels of civilisation. The simplest form of this belief is found amongst several tribes of Africa and America who think the poor shivering soul at death must look out for a new host to inhabit, and if need be will enter the body of an animal. This re-incarnation is most often considered as taking place through the soul of a dead man animating the body of an infant of his own kindred or descent, thus accounting naturally for the likeness between parents and children and for the stranger phenomena of atavism. And hence even the persistent transmission of old family names is not without its significance. The Yoruba negroes greet a new-born child with the words 'Thou art come,' and then decide which ancestral soul has returned. Many peoples in Africa consider white men their own *manes* returned from the grave, finding proof both in their pale colour and superior wisdom.

Still further the primitive notions of the intimate brotherhood between men and beasts make it easy to account for the transmission of human souls into the bodies of the lower animals. Familiar examples of this are the Zulu *amatongo*, ancestral snakes which may even be identified by some peculiar mark similar to what the man bore in life, and the birds which the Iroquois set free on the evening of a burial to carry away the soul. Both Brahmins and Buddhists admit human descent not into beasts alone, but plants and trees, and the Buddha himself, before his last birth as Sakyamuni, underwent as many as 550 births through such stages as a hermit, a king, a slave, an ape, elephant, snipe, fish, frog, and the genius of a tree. When he attained the perfect knowledge of the Buddha he was able to recall all these existences, and these accounts form the *Jatakas*. The doctrine of transmigration (Samsâra) does not seem to have belonged to the early Aryan faith, but it lies at the heart of the accepted Indian philosophy, affording a satisfactory explanation of the phenomena of phenomenal existence. The present is ever determined by the past in an unbroken line of causation, and every sentient being is a prey to ever-renewed suffering and sin, destined after every new existence to be born in some new form. The real aim of life is to discover by what means to obtain release from the burden of material existence and find union in absorption with the Supreme Self.

It seems certain that the ancient Egyptians believed in the transmigration of souls; among the Greeks it was a doctrine especially associated with Pythagoras, and apparently with the Orphic and other mysteries. Pythagoras, we are told, himself recognised in the temple of Hera the shield he had borne as Euphorbus at the siege of Troy. The bodily life of the soul is itself an imprisonment for sins committed in a former state of existence—the reward of the best men is to enter the *kosmos;* of the worst, to sink to Tartarus. The general lot is to live anew in human or bestial forms according to the degree of guilt to be atoned for. This same doctrine of retribution and purificatory wandering meets us again in Plato's speculations on the future life. Among the Jews the Kabbalists accepted the doctrine (*Gilgul Neshamoth*), and it formed an essential part of the Manichæan philosophy. Into Christianity it has never made much way, for although the doctrine of pre-existence touched it at one point, yet the souls of all mankind created by God before the world remained still and silent in the realm of potentiality until united with human bodies at generation. A shadow of transmigration appears in the vagaries of Swedenborg, and it has continued to survive in the speculations of occasional philosophers. Even a thinker so strong as Lessing adopted it as a theory to account for the infinite conceptions of which the finite soul is capable, these being only acquired gradually in an infinite succession of time. See ANIMISM, ANIMAL-WORSHIP, BUDDHISM, EGYPT (RELIGION), IMMORTALITY, PRE-EXISTENCE; and cf. THEOSOPHY.

Transmission of Power means the doing of useful work at a distance from the engine or whatever other source supplies the energy. An ordinary tow-rope evidently fulfils such a function; and in a wide sense all forms of connecting rods, Belting (q.v.), and similar gearing (see WIRE-ROPES) do the same. The revolving shaft of a screw-steamer transmits rotatory motion through a considerable distance; but for long distance transmission ordinary mechanical devices, if they do not altogether fail, lose greatly in efficiency. In a series of shafts geared one to another by beltings there must be considerable loss through slipping. In the Pneumatic Despatch (q.v.) and in Boring (q.v.) compressed air has been successfully applied as a transmitter of power. Cable cars (see TRAMWAY) also form a good illustration. It is in electricity, however, that we find the most promising agent for indefinite transmission of power. Thus a dynamo-electric machine may be worked by a waterfall; its voltage or potential may be transmitted along wires to distant stations, and there transformed into currents capable of driving an electric motor and keeping a whole factory in operation. At the Frankfort Exhibition (1891) such a power was transmitted 109 miles. See DYNAMO-ELECTRIC MACHINERY, and ELECTRIC LIGHT.

Transpadane Republic. See CISALPINE.

Transplanting, the act of removing bodily a plant or tree from the place in which it grows, and establishing it in the same or another place. The operation is in continual practice in gardens and nurseries throughout the year, and it is of immense practical utility. But for the facility with which the great majority of cultivated plants may be transplanted, gardens would be comparatively profitless and uninteresting, and pleasure-grounds and the landscape be adorned only with indigenous forms of trees, shrubs, and flowers. In the large trade nurseries transplanting is one of the chief occupations of the workers. Seedling forest trees are reared annually in hundreds of thousands, and either are transplanted in the nursery to adapt them for special purposes, or are transferred from the seed-bed at the age of one or two years direct to moors and hillsides to form woodlands. Ornamental shrubs from all temperate countries are in the same way prepared for distribution. Fruit trees are especially benefited by the process. By frequent transplantings fruitfulness is accelerated in young fruit trees, and the operation is systematically resorted to in order to maintain fertility in those that are more aged.

The operation is most practicable in the youthful stage of all plants. In those that are aged and have been long established in one place it is attended with danger, chiefly because in the case of large trees and shrubs it is impracticable to

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preserve uninjured a sufficiency of the fibrous roots to draw nourishment from the soil. Yet very large trees have been successfully transplanted. At Chatsworth, Dropmore, and many other places trees exceeding 50 tons weight have been transplanted from one situation to another several miles distant. Such herculean operations in transplanting, while quite practicable, are attended with an amount of expense and hazard which precludes their being generally engaged in. Yet at the places named, and others equally notable, sylvan effects have been created in bleak, treeless situations in two or three years by this means, which would have taken half a century to produce in the ordinary course. In moving trees of a size exceeding that which two or three men may easily handle, transplanting machines are required. These are of various kinds, and each has special merits not possessed by others. The best machines for the removal of very large trees from one place to another are Barron's and M'Glashan's. These two inventions have some features in common; they are ponderous four-wheeled carriages in which the tree is swung in chains or on a platform upright as it grew, and may be carried any distance where bridges overhead do not occur in the way. M'Nab's apparatus (see figure) is the best for lifting trees and shrubs of considerable size, but is incapable of the ponderous work of either of the other machines, and it has the further disadvantage that the tree must be carried in a horizontal position. The transplanting of large trees successfully involves the possession of considerable experience of the work by the person superintending it. He should know the proper time or season for the transplanting of each kind of tree with which he has to deal. Various kinds of trees are not all amenable to the same methods. Greater care is required in every stage of the work with some than with others. The prime object to keep in view in every case is the preservation of the fibrous roots; every one of these destroyed lessens the chances of success. When it is determined to transplant trees which have been growing undisturbed for some years, it is necessary to prepare them one or two years prior to lifting them. A trench is opened in a circle 2, 3, or more feet—according to the age and size of the tree—from the bole all round, and all the roots are cut off beyond the circle. The trench is carried deep enough to reach all the roots, and is then filled up either with the earth excavated or, in cases requiring special care, with soil of a kind more favourable to the formation of fibrous roots. The mutilated roots send out new feeders into the new soil, and if the work has been properly done they will be numerous enough one or two years hence, according to the peculiarities of the subject, to bind the new soil in a compact mass, and thus facilitate the transportation of a considerable ball of earth along with the tree.

M'Nab's Transplanter.

Limes, poplars, willows, and such-like quick-growing and free-rooting trees are more easily transplanted when of considerable age than oak, beech, sycamore, and the like. Evergreen trees and shrubs transplant most successfully in spring, when they are beginning to grow. Deciduous subjects on the other hand succeed best when transplanted immediately after the fall of the leaf. Surrounding the roots with light compost and watering, and mulshing the area over which the roots extend to lessen evaporation, are ordinary but essential means to success, especially in the case of large and difficult subjects. Securing the tree at once against disturbance by wind after it is planted is of vital importance.—For the transplanting of skin, see SKIN, RHINOPLASTIC OPERATIONS; and of teeth, see DENTISTRY.

Transport. See COMMISSARIAT, NAVY.

Transportation, technically as distinguished from Banishment (q.v.), the removal of offenders beyond seas, but loosely used for the removal of convicts to foreign or distant regions by sea or land. The history of English transportation is fully treated at PRISONS. For French and Russian transportation, see GUIANA, NEW CALEDONIA, SIBERIA.

Transposing, in Music, is changing a piece of music in performance from the key in which it is written to another key. To play at sight an accompaniment for such an instrument as the pianoforte or organ, transposed from one key to another, requires considerable artistic skill. To the singer transposal presents no difficulties.

Transubstantiation. The meaning of the theological term transubstantiation is made apparent in the following canon of the Council of Trent: 'If any one shall say that, in the most holy sacrament of the Eucharist, there remains the substance of bread and wine together with the body and blood of our Lord Jesus Christ; and shall deny that wonderful and singular conversion of the whole substance of the bread into the body, and of the whole substance of the wine into the blood, the species of bread and wine alone remaining—*which conversion the Catholic Church most fittingly calls Transubstantiation*—let him be anathema' (*Conc. Trid. Sess.* xiii. Can. 2). The canon just quoted was intended as a condemnation of the theories of impanation and consubstantiation. According to the theory of impanation, which was advocated chiefly by Osiander, in the sacrament of the Eucharist the bread and wine are hypostatically or personally assumed by the Divine Word. According to the theory of consubstantiation, which was favoured by the large majority of the Lutherans, the substance of the bread and wine remain together with the body and blood of Jesus Christ, but without being hypostatically assumed.

The doctrine of transubstantiation is then an article of Roman Catholic faith. Furthermore, the Council of Trent in the same Session xiii. declares that this doctrine 'has always been the conviction in the church of God.' Protestant divines call in question the truth of this declaration, and assert that the doctrine was unknown before the middle ages. Roman Catholic theologians on the other hand, while admitting that the *term* transubstantiation is comparatively new, profess their ability to prove by a *catena* of witnesses, commencing with the earliest ages of the church, that the *doctrine* conveyed by the term has been believed from the first. That the *term* is comparatively new is unquestionable. Cardinal Franzelin, indeed (*De Eucharistia*, page 177), gives instances of its use by Catholic writers in the 11th and 12th centuries. Nevertheless it was not formally adopted into the doctrinal phraseology of the church before 1215,

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when it was employed in a profession of faith drawn up by the fourth Lateran Council. After this period we find the term again employed in a 'confession of faith' which was presented for subscription to Michael Palæologus, the Greek emperor, by Pope Clement IV. (1267), and was professed by the emperor in the second Ecumenical Council of Lyons held in 1274 under Pope Gregory X.

That the *doctrine* conveyed by the term transubstantiation is at least much older than the term all historians must admit. Berengarius of Tours, who had attacked the prevalent teaching on the Eucharist, was required by a council held in Rome under Pope Gregory VII. (1079) to make the following profession of faith: 'I, Berengarius, believe in my heart, and profess with my lips, that the bread and wine which are placed on the altar are *substantially changed into* the true and proper and life-giving flesh of our Lord Jesus.' And in the largely attended council held at Piacenza (1095), seven years after the death of Berengarius, it was once more declared that 'the bread and wine, when they are consecrated upon the altar, are *truly and essentially changed into* the body and blood of our Lord.' In a treatise *On the Sacrament of the Body and Blood of Our Lord Jesus Christ*, written by Paschasius Radbertus (831), the author very plainly stated the doctrine of transubstantiation. Some of the views expressed in this treatise were traversed by Rabanus Maurus, Ratramnus, and other contemporary writers; but the author's teaching on transubstantiation was challenged by no one.

It is admitted, with more or less of unanimity, that from the days of Paschasius Radbertus down to the period of the Reformation the doctrine of transubstantiation was in general acceptance. But when the inquiry turns upon the belief of the early fathers this unanimity disappears. Catholic theologians assert that the expressions employed by the Greek and Latin fathers, when treating of the effect of the Eucharistic consecration on the substance of the bread and the wine, are irreconcilable with any theory but transubstantiation. Leibnitz is disposed to grant the truth of this contention. 'The records of pious antiquity,' he writes, 'plainly enough demonstrate that the bread is changed into the body, and the wine into the blood of Christ; the ancients, too, universally acknowledged therein a change of substance, which the Latins have aptly rendered transubstantiation' (*System of Theology*). But in making this concession Leibnitz parts company with the great majority of Protestant divines. The latter contend that the change indicated by the language of the fathers is not a change in the substance of the elements, but a change in their use, efficacy, and dignity.

Transubstantiation is a doctrine not only of the Roman Catholic, but also of the Greek Church. In 1643, as a protest against the Calvinist 'Confession of Faith,' which had been drawn up by Cyril Lucaris, and circulated amongst the Christians of the East, and with the view of preventing any further attempts to unite the Reformed and Greek churches, a 'Profession of Orthodox Faith' was formulated by Peter Mogilas, archbishop of Kieff and primate of all Russia, and was subscribed by Parthenius, patriarch of Constantinople, Joannicius, patriarch of Alexandria, Macarius, patriarch of Antioch, Paisius, patriarch of Jerusalem, and the other metropolitans and bishops of the Greek and Russian churches. This profession, which is divided into 'Questions,' treats from question 98 to question 119 of the seven sacraments, explaining the use, nature, sanctity, and efficacy of each. Under question 107 the doctrine of transubstantiation is distinctly enunciated as follows: 'When these words (of consecration) are pronounced, immediately transubstantiation (ἡ μετουσίωσις) takes place; the bread is transubstantiated into the true body of Christ, and the wine into the true blood, the species alone remaining.' At the Synod of Jerusalem, held (1672) under the presidency of the patriarch Dositheus, this profession was solemnly confirmed as the expression of the faith of the entire Eastern Church.

Transubstantiation differs from all natural changes in this, that natural changes, even though they may be substantial changes, such as, e.g., the conversion of food by the processes of assimilation into the substance of the person nourished, or the conversion of wood into ash by the action of fire, are, at most, transformations. When, e.g., wood is converted into ash, the *form* or *active* principle which made the original substance to be wood gives place to a *form* that makes the substance, which is the term of the change, to be ash. But the *matter* or *passive* principle, which before the change was the subject or recipient of the substantial form of wood, remains after the change as the subject or recipient of the substantial form of ash. And thus in all natural changes, even though they be substantial, there is not an entire but only a partial change of substance. The active principle of the original substance is changed, but the *passive* principle remains. In transubstantiation, however, both the *matter* and the *form* of the bread and wine are changed, for, according to the Tridentine definition, there is a 'conversion of the whole substance of the bread into the body (of Christ) and of the whole substance of the wine into the blood.' Another respect in which transubstantiation differs from all natural changes is indicated by those other words of the Tridentine definition, 'the *species* of bread and wine remaining.' By *species* is here meant *accidents*. As *accidents* have no existence of their own, but exist with the existence of the substance in which they inhere, it follows that when that substance is destroyed its accidents must in the ordinary course of things cease to be. Thus, e.g., the external manifestations and the active and passive qualities of wood do not exist after wood has been converted into ash. But in transubstantiation the external manifestations, such as shape, colour, flavour, odour, &c., the passive powers of corruption, &c., the active powers of nutrition, &c., and the other forces and characteristics of bread and wine, continue to exist and to operate after the destruction of the substances on which they naturally depend. To hold, as Magnan and other Cartesians have done, that these accidents remain as mere phenomena and subjective impressions, void of objective reality, is to hold what is in opposition not only to experience, but also to the common teaching of the Catholic Church, as expressed, e.g., in the 'Catechism of the Council of Trent,' part ii., chap. 4, q. 43. But though the accidents persist after the subject in which they naturally inhere is withdrawn, they do not acquire the mode of being which is proper to substance, for they exist not *per se*, but by the 'extraordinary concursus' of God, and, while not actually existing in substance, they still retain an essential relation to substance as their subject. S. Thomas Aquinas (*Sum. Theol.*: tertia pars, q. 77, art. 2), holding with Aristotle that extension is the 'first disposition' of matter, and that all other accidents in consequence are referable to material substance 'through the medium of extension,' is of opinion that the extension of the bread and wine receives from God the power to act as the 'quasi subject' and support of those other qualities of bread and wine which manifestly exist and operate after transubstantiation has been effected.

Transvaal (officially, THE SOUTH AFRICAN REPUBLIC), a country in the highlands of South-

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east Africa, bounded on the N. by the territories of Great Britain now administered by the British South Africa Company; on the E. by Portuguese East Africa, Swaziland, and Zululand; on the SE. by Natal; on the S. by the Orange Free State; and on the W. by British Bechuanaland. The length of the country from the Vaal River, its southern boundary, to the Limpopo River, which marks its northern limit, is over 400 miles, while a line between the extreme southern and eastern points running from 25° to 32° E. long. reaches 700 miles.

Previous to 1830 the land was a *terra incognita* so far as European knowledge or influence went, and was inhabited by several clans of the Bantu race, speaking dialects of the Bantu tongue. These clans were ruled by a branch of the Zulu race under the paramount chief Umziligase. The country was noted for its abundance of game; on the great undulating plains of the High Veldt or plateau (from 4000 to 7000 feet above the level of the sea) many varieties of the antelope family roamed in tens of thousands. In the valleys and well-timbered savannahs of the low country large game, consisting of the giraffe, elephant, buffalo, lion, leopard, &c., abounded, causing many parts to be dangerous for human habitation. The large rivers were full of alligators, hippopotami, and fowl; indeed, early hunters such as Harris and Gordon Cumming found here a sportsman's paradise. The fifth decade of the 19th century saw the first concerted intrusion of Europeans on this wild scene. A few Cape Colony farmers, offended by some regulations promulgated by certain crown officials, sacrificed their land and belongings, harnessed their cattle to their long lumbering wagons, and, taking with them their families and the most rudimentary necessaries of life (as well as a good supply of lead and powder and a tried musket), struck for the north, preferring the chances of death by wild animals or wild men to the irritating exactions of petty officialdom.

The pastoral wealth of the country was such that during the subsequent years on to 1870 the stream of Boer *voortrekkers* (Anglice, 'pioneers') fitfully continued to enter, fight for, and possess the land. They had a number of sanguinary battles with Umziligase and his paramount clan. After great slaughter of both sexes and all ages on both sides, the black chief and his people were forced to migrate over the Limpopo, where they peopled the territory of Matabeleland now occupied by their descendants. The other native clans lived on with the Boers, and were gradually subdued or driven out. Native wars were of frequent occurrence, and little progress was made in the development of the country. The Boers then, just as they are to-day, were essentially pioneers. They had none of the trader's instinct, and they did not till the soil to any great extent. Their land rights being scattered far and wide over a country without communications and with no markets to speak of, consumption of soil products was limited to the wants of the individual producer. The little commerce was in the hands of British firms, and nine-tenths of the trade of the country, export and import, remains in British hands.

In 1877, owing to an exhausted public treasury and accumulated debts brought about by chronic native wars, the republic was on the eve of dissolution, and the country about to relapse into barbarism. To avert this catastrophe the British government assumed the care of it, subjugated by imperial forces and Swazi levies certain rebellious natives, and put the finances of the state in order. The promises to the Boers, however, on the subject of self-governing institutions made for the home government at the time the country was annexed were not carried out. Arbitrary officials and military martinets were appointed to rule on behalf of the crown. By reason of their lack of tact, as well as of irritating regulations and the non-fulfilment of political engagements, friction was created between the governing and the governed—the English and the Boers. The spark which caused the explosion that had its final and humiliating episode in Majuba (q.v.) was an ill-timed enforcement of a petty tax. The English officials called out the Queen's troops in ignorance of the fact that the whole state felt sympathetic with a now common cause. Then followed the Transvaal war, the death of General Colley, and the signing of terms of peace, resulting in the conventions of 1880 and 1884 between England and the Transvaal. The first gave the Boers republican rights, but retained British control over boundaries, native affairs, and foreign relations. The 1884 convention modified the restrictions considerably, but left sufficient power to Britain to prevent the Boers doing themselves any injury by foreign intrigue or by the reckless absorption of fresh territory. Since then the state has progressed rapidly, chiefly owing to mineral discoveries and the great development of the gold industry. The gold production from the whole country for the five years ending 1891 was about 2,500,000 ounces; and the expectation is that the country will soon rank amongst the chief gold-supplying lands. In 1887 the Witwatersrand gold-fields yielded 34,897 ounces; in 1891 they put out 729,213 ounces. The receipts from customs duties on merchandise, provisions, beer, spirits, tobacco, machinery, &c. have been: 1886, £61,389; 1887, £190,792; 1888, £249,923; 1889, £372,919; 1890, £381,190. The revenue of the country in 1889 was £1,577,445; in 1890, £1,229,060; and in 1891, £967,191. The expenditure in 1889 was £1,226,135; in 1890, £1,531,461; and in 1891, £1,350,073. The recent decrease in the revenue was but the reaction from an abnormal state of speculative activity caused by the undue inflation of the values of gold company shares. The trade of the country is now on a sounder, because of being on an industrial, basis, and the revenue is steadily recovering. In July 1892 the state easily raised a loan of 2½ millions sterling for railway construction.

The population was, at the imperfect census of 1890, set down at 119,128 Europeans, of which half consists of the original pioneer Boer population. The remainder are British born or British colonial. There are emigrants from most of the other European nations also. The aboriginal native population was estimated at 560,064, and the British Indian population at 2000. The balance of numbers is gradually telling on the side of the English-speaking residents, owing to the steady influx of new arrivals. The climate is, as a rule, healthy, and in some parts exceptionally bracing. The power of government is in the hands of the Boers, and is exercised through a parliament of two chambers. Burghers alone vote for or sit in these chambers, and the English incomer or 'uitlander,' as he is called, has at present to be content with the force of public opinion. There is no state religion, but all denominations of the Christian church, with Jewish synagogues and Mohammedan mosques, flourish, and have free rights. The Boers themselves are divided sharply into several divisions of the Dutch Reformed Church.

The system of law is Roman Dutch, and is administered in the high and circuit courts by judges (chiefly English barristers), and in the lower courts by landdrosts (stipendiary magistrates). The gold laws are administered by special executive and judicial officers, with appeals to the Supreme Court. The official language is Dutch, but English is that of everyday life, and is becoming fast that of

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the state. Dual language and a political franchise admitting the English residents may be looked for shortly. The state has immense latent wealth in its minerals, for, in addition to the numerous gold-fields, the proven deposits of silver with copper and lead, of iron, coal, cobalt, and other metals and minerals, are sufficient to show that nature has favoured the Transvaal beyond all African states. The country is rich in corn and pasture land, and is coming gradually under cultivation. Coffee and rice are luxuriant in certain parts.

The natural seaports of the Transvaal, geographically speaking, are Delagoa Bay and Durban, Pretoria being distant (by Colonel Machado's railway survey) 348 miles from the former, and 441 miles from the latter. From Delagoa Bay, Durban, and the Cape Colony ports lines of railway were in 1892 fast approaching the centre of the state. Potchefstroom (5000) is the capital of the state, Pretoria (15,000) is the seat of government, and Johannesburg (40,000) is the great centre of the mining, as it is of the financial, world of the Transvaal. Three imperial (British), one colonial, one state, and several foreign banks transact business in the several towns. The coinage is British.

See Aylward's *Transvaal of To-day* (new ed. 1881); Jeppe's Almanac; Lady Bellairs, *The Transvaal War* (1885); J. Nixon, *The Complete Story of the Transvaal* (1885); Mather's *Golden South Africa* (new ed. 1889); the publication *South Africa*; C. J. Alford, *Geological Features of the Transvaal* (1891); and W. L. Distant, *A Naturalist in the Transvaal* (1892).

Transylvania, formerly a principality of the Austrian empire, since 1867–68 an integral part of Hungary, is fenced on the north, east, and south by the rugged outer ranges of the Carpathians from the low plains of Galicia and Roumania. The interior, a greatly diversified plateau region, is crossed by numerous mountain-chains, and drained by the tributaries of the Theiss and the Pruth. The Latin name of the country, which it has borne since the 12th century, refers to the woods dividing it from Hungary; the Hungarian name Erdély ('Forest Land') is justified by its extensive forests (37½ per cent. of the total area of 21,512 sq. m.). Nevertheless 49 per cent. of the soil, which is very fertile in most parts, is under cultivation or grass, and yields maize, wheat, oats, wine, fruit, flax, hemp, tobacco. The mineral wealth is very considerable, salt (40,000 tons per annum), gold, silver, copper, quicksilver, iron, and lead being the most important ores. Mineral springs abound. The population, 2,084,048 in 1880, and 2,247,049 in 1890, consists of several races. The most numerous are the Roumanians or Wallachians, 55 per cent. of the total; they are mostly breeders of cattle and keepers of sheep and swine, and belong to the Greek Churches. But the most important politically are the Hungarians and Szeklers, and the Germans or Saxons. The former, 29 per cent., are farmers and Roman Catholics or Unitarians. The Szeklers are a tribe who have best preserved the typical qualities of the Magyar race. The Saxons, nearly 10 per cent., farm, grow fruit and wine, and carry on what little industry there is, such as the making of textiles, leather, glass and pottery, soap, and hats; they are mostly Protestants. In addition there are nearly 50,000 Gypsies, some of them settled; 20,000 Jews, the petty dealers of the country and its brandy distillers; Greeks and Armenians, who constitute the mercantile class; and Slavs. Kronstadt, Klausenburg, and Hermannstadt, the principal towns, have between 21,500 and 32,000 inhabitants each. Klausenburg is the seat of a university (1872).

Transylvania, originally called Dacia, was subjected to Roman power by Trajan in the year 107. The Romans were obliged to abandon it to the Ostrogoths; and the Ostrogoths were followed by the Gepidæ, and they by the Petchenegs. King Stephen of Hungary began to reduce it to his rule in the first years of the 11th century. One hundred and fifty years later King Geisa II. brought in large numbers of German (Saxon) colonists from the lower Rhenish districts, and added them to the descendants of the Romano-Dacians and the Magyars who had settled on the north-eastern frontiers (Szeklers). The Saxons were granted a liberal measure of self-government; and from the land being divided into seven principal administrative divisions it acquired the name of *Siebenbürgen*—i.e. the Seven Strong Towns. During the first half of the 16th century the imperial governor or woiwode of Transylvania, John Zapolya, asserted his independence of the emperor (who was also king of Hungary); and this order of things lasted down to 1690. The princes of Transylvania, who were usually elected by the people, were generally hostile to the emperor, and found support in their hostilities from the sultan, whom they in some respects regarded as their suzerain. During the first half of the 19th century the Hungarian elements of the population strove to promote a closer union with Hungary, and at the same time stoutly asserted the ancient rights of which the people of Transylvania (except the Roumanians) had been gradually deprived by the imperial governors. The Roumanians, too, petitioned very earnestly for the same political rights as the Magyars, Szeklers, and Saxons enjoyed. These various conflicting claims resulted in 1848 in a fierce racial war, in which General Bem, acting in conjunction with the Hungarians, for some time successfully withstood the forces of the emperor (the Austrians), the Russians, and the Roumanian levies. After hostilities had ceased in 1849 Transylvania was made a crown-land of the Austrian empire, its ancient rights being restored to it eleven years later. But in 1867–68 the Hungarian party effected the complete union of the country with Hungary, and since then it has been 'Magyarised' apace.

See E. Gerard, *The Land beyond the Forest* (1888); C. Boner, *Transylvania* (1865); Josef Haltrich, *Zur Volkskunde der Siebenbürger Sachsen* (ed. J. Wolf, Vienna, 1885); and *Siebenbürgisch-Deutsche Volksbücher* (3 vols. 1885), by Fr. Müller, Haltrich, and Fr. Fronius.

Trap (Sw. *trappa*, 'a stair'). Under this term were formerly included various crystalline igneous rocks, most of which are basic in character. These frequently enter more or less conspicuously into the formation of certain hills and mountains—the igneous rocks being often arranged in horizontal or approximately horizontal beds, separated by intervening layers of some more yielding material, such as tuff, shale, sandstone, &c. Under the influence of denudation the relatively hard crystalline rocks come to stand out like huge steps on hill-faces and mountain-slopes, which thus acquire a step-like contour. The term is now disused. Most of the trap-rocks are varieties of Basalt (q.v.), while under the same head were formerly included certain diorites and porphyrites (see IGNEOUS ROCKS).

Trapa, a genus of plants of the natural order Onagrariæ, and named from the resemblance of the fruit to a Caltrop (q.v.; Low Lat. *calcitrapa*). The genus comprises only two or three species, all aquatic and natives of central and southern Europe, India, China, and Japan. The seeds of all abound in starch, and are much used for food. The more familiar is the *T. natans*, or Water Chestnut (French *Marron d'Eau*). *T. bispinosa*, the Singhara Nut, affords a great part of the food of the inhabitants of Cashmere.

Trapani (anc. *Drepanum*), a seaport of Sicily, and capital of a province in the north-west of the

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island, stands on a tongue of land 40 miles W. of Palermo, but nearly twice that distance by rail. It has a trade in wheat, wine, olives, sumach, salt, tunny fishes, sponges, and coral. Since 1860 it has been transformed: most of its fortresses have been removed to make room for promenades, gardens, new streets, and monuments; a suburb 2 miles long has been built; and the place is now noticeably clean, and plentifully supplied (since 1891) with good water brought 60 miles. Pop. 32,020. The ancient *Drepanum* was probably founded by the Carthaginians; and here they utterly defeated the Romans in a celebrated naval engagement in 249 B.C.

Trapezium. Euclid defined a trapezium as any quadrilateral except a square, an oblong, a rhombus, and a rhomboid. Later Greek geometers seem to have used the word in the more restricted sense of a quadrilateral with one pair of parallel sides; and the word trapezoid was introduced to describe a quadrilateral which had no two sides parallel. On the Continent the words are so distinguished to this day. By English geometers and writers on mensuration the words got interchanged as regards their significance, so that with us a trapezoid is generally defined as a quadrilateral with two parallel sides. Thus English writers have retained trapezium in the broader sense, and have used trapezoid in the restricted sense of a Euclidean trapezium with two sides parallel. The continental custom is historically and etymologically the better. There is, however, hardly a necessity for both words, since the word quadrilateral is now invariably used by modern geometers for a four-sided figure which is not a parallelogram.

Trappists, a religious order, celebrated for its extraordinary austerities, is so called from an abbey of the Cistercian order, founded in the middle of the 12th century, in the narrow valley of La Trappe, near Mortagne, in the Norman department of Orne—called 'the trap' because of its inaccessibility. The discipline of this monastery, in common with many others of the more wealthy monastic bodies, especially of those which were held *in commendam*, had become very much relaxed. In the first half of the 17th century the abbey of La Trappe fell, with other ecclesiastical preferments, to Dominique Armand-Jean le Bouthillier de Rancé (1626–1700), originally an accomplished but worldly courtier, who suddenly underwent a great change and turned his back on the vanities of the world. He undertook a reform of his monastery, and in the end established what was equivalent to a new religious order. It was in 1662 that he commenced his reforms. At first he encountered violent opposition from the brethren; but his firmness overcame it all. He himself entered upon a fresh novitiate in 1663, made anew the solemn profession, and was reinstalled as abbot. From this time may be dated the introduction of the new austerities which characterised the order. The monks were forbidden the use of meat, fish, wine, and eggs. All intercourse with externs was cut off, and the old monastic habit of manual labour was revived. The reform of De Rancé is founded on the principle of perpetual prayer and entire self-abnegation. By the Trappist rule the monks are obliged to rise at two o'clock A.M. for matins in the church, which last till half-past three; and after an interval occupied in private devotion they go at half-past five to the office of prime, which is followed by a lecture. At seven they engage in their several daily tasks, indoors or out, according to the weather. At half-past nine they return to the choir for the successive offices of terce, sext, and none; at the close of which they dine on vegetables dressed without butter or oil, or on vegetable soup, and a little fruit. Milk and cheese are used save in time of fast; the sick are allowed eggs. The dietary is not the same in all the houses of the order. In some light beer or wine is sparingly allowed. The principal meal is succeeded by manual labour for two hours, after which each monk occupies an hour in private prayer or reading in his own cell until four o'clock, when they again assemble in the choir for vespers. The supper consists of bread and water, and after a short interval of repose is followed by a lecture. At six o'clock they recite compline in choir, and at the end spend half an hour in meditation, retiring to rest at eight o'clock. The bed is a hard straw mattress, with a coarse coverlet; and the Trappist never lays aside his habit, even in case of sickness, unless it should prove extreme. Perpetual silence is prescribed, save in cases of necessity, and at certain stated times; only the abbot and the guestmaster are allowed to speak to strangers. But conversation by means of manual and other signs is practised. The minor practices and observances are devised so as to remind the monk at every turn of the shortness of life and the rigour of judgment; and the last scene of life is made signal in its austerity by the dying man being laid during his death-agony upon a few handfuls of straw, that he may, as it were, lay aside upon the very brink of the grave even the last fragment of earthly comfort to which the necessities of nature had till then compelled him to cling.

The reformed order of La Trappe scarcely extended beyond France in the first period of its institution. The inmates of La Trappe shared, at the Revolution, the common fate of all the religious houses of France: they were compelled to quit their monastery; but a considerable number of them found a shelter at Valsainte, in the canton of Fribourg in Switzerland. In the vicissitudes of the revolutionary war they were driven from this house; and a community numbering about 250, together with a large number of nuns who had been established for purposes of education, found refuge at Constance, at Augsburg, at Munich, and even in Russia. Later in the course of the war small communities obtained a certain footing in Italy, Spain, America, England, and, notwithstanding the prohibitory law, even in France, at Mont Genèvre. After the Restoration they resumed, by purchase (1817), possession of their old home at La Trappe, which continued to be the head monastery of the order. During the course of the next fifty years they formed many establishments in France, the house of La Meilleraye being one of the most famous abbeys. When in 1880 1450 brethren of the order were expelled from France only a comparatively small number were left. In England the Cistercian house of St Bernard in Leicestershire is Trappist; so is the convent at Stapehill in Dorset. In Ireland the order has houses at Mount Melleray, near Cappoquin, in Waterford, and at Roscrea in Tipperary. America has houses at Gethsemane in Kentucky, at New Melleray, near Dubuque, Iowa, at Tracadie in Nova Scotia, and at Oka, on the Ottawa River, 36 miles from Montreal; there are houses in Germany, Algiers, Italy, and Belgium; there is even one (of German brethren) in Turkey.

See works quoted at MONACHISM; Gaillardin's *Trappistes; ou l'Ordre de Citeaux au 19 Siècle* (1844); Pfannenschmidt, *Geschichte der Trappisten* (1873); *Good Words* for 1884; for the Gethsemane house, the *Century*, August 1888; and Comte de Charencey, *Cartulaire de l'Abbaye de Notre Dame de La Trappe* (1891).

Trasimene Lake, a shallow Italian lake lying between the towns of Cortona and Perugia. Surrounded on all sides by hills, it is about 10 miles in length by 8 in breadth. There is no

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outlet, and the margins are flat and overgrown with reeds, but of late largely planted with eucalyptus trees. It is proposed to drain the lake, which is memorable for the great victory obtained by Hannibal (q.v.) in 217 B.C. over the Romans.

Tras-os-Montes. See TRAZ-OS-MONTES.

Trass. See TUFF.

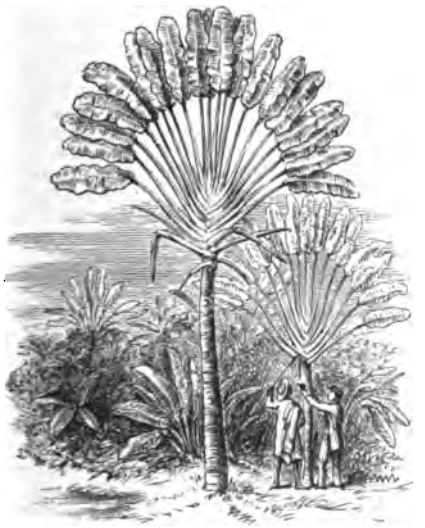
Traun See. See GMUNDEN.

Travancore (*Tiruvánkod*), a protected state in the extreme south of India, bounded on the N. by Cochin, on the E. by British territory, and on the W. by the Indian Ocean. The state pays a yearly tribute of £80,000 to Britain, and is politically connected with the province of Madras. Area, 6730 sq. m.; pop. (1881) 2,401,158; (1891) 2,557,840, mainly Hindus, belonging to 420 castes, from Brahmans to Negroid hill-men. Nairs are over a fourth of the total, Mohammedans only 7 per cent. There are many native Christians of the Syrian rule (see THOMAS, CHRISTIANS OF ST), and some black Jews. At the southern extremity of the state is Cape Comorin; the Western Ghâts run along the eastern side. The physical appearance of the higher part of the country, which is varied and picturesque, is described at GHÂTS. Westward of the hill-foots is a level belt, 10 miles wide, covered with cocoa-nut and areca palms. On the elevations the soil is light and gravelly; in the valleys it is in general a deep black mould. The lagoons or backwaters along the coast, which Travancore shares with Cochin, are explained at COCHIN. The chief produce is copra, coir, tobacco, nut-oil, areca-nut, ginger, pepper, cardamoms, beeswax, coffee, and timber. The rajahs are intelligent, have been faithful to the English alliance, cherish education, and govern well. The capital is Trivandrum; other principal places are Aulapolai and Quilon. See Mateer, *Native Life in Travancore* (1883).

Travellers. See COMMERCIAL TRAVELLERS, CARRIERS, INN.

Traveller's Joy. See CLEMATIS.

Traveller's Tree (*Ravenala madagascariensis*, or *Urania speciosa*), a remarkable plant of the natural order Scitamineæ, a native of Madagascar,



Traveller's Tree (*Ravenala madagascariensis*).

and forming a characteristic feature of the scenery of many parts of that island. The stem resembles that of the plantain-tree, but sends out leaves only on two opposite sides, like a great expanded fan. The lower leaves drop off as the stem grows, and in an old tree the lowest leaves are sometimes 30 feet from the ground. A tree often has twenty or twenty-four leaves, the stalk of each leaf being 6 or 8 feet long, and the blade 4 or 6 feet more. The blade of the leaf is oblong, bright green, and shining. The fruit is woody, capsular three-celled, the seeds are arranged in two rows in each cell, and are surrounded by a pulpy blue aril. Forty or fifty fruits grow in a bunch, and three or four bunches may be seen at once on the tree. The leaves are much used for thatch, and for many other purposes, and the leaf-stalks for the partitions, and often even for the walls of houses. It received its popular name, *Arbre des voyageurs*, first from the French on account of the stores of pure water found in the large cup-like sheaths of its leaf-stalks, and which is readily obtained by tapping the sheaths at the base. There is a similar tree called 'Traveller's Fountain' in the Malay Peninsula.

Travemünde. See LÜBECK.

Travertin, the Italian name for limestone formed by springs holding lime in solution. See CALCAREOUS TUFA.

Travnik, a town of Bosnia, once its capital, stands on the Lasva River, 45 miles NW. of Bosna-Serai by rail. Pop. 5933.

Trawling. See FISHERIES.

Traz-os-montes ('Beyond the Mountains'), a province of Portugal, forming the north-east corner of the country, is bounded on the N. and E. by Spain, on the S. by the river Douro, and on the W. by the province of Minho. Area, 4291 sq. m.; pop. 396,876. It is in the main a cold plateau, with bare mountain masses, broken through by deep romantic ravines; but the port-wine district known as the *Alto-Douro* is fertile. Wine is the chief product, but the mountains are also rich in unutilised metallic wealth.

Treacle, the dark, viscous, uncrystallisable syrup obtained in refining sugar; also the drainings of crude sugar, properly distinguished from treacle as molasses. The etymology and the original meaning of the word are explained in Theriaca (q.v.). See SUGAR, SYRUP.—For the *Treacle Bible*, see BIBLE, Vol. II. p. 127.

Treacle Mustard, a popular name for the genus of cruciferous plants described at ERYSIMUM. Alliaria is another name that used to be given to the genus.

Tread-wheel, an apparatus used in the prisons of Great Britain for enforcing a portion of the sentences of imprisonment with hard labour. Sir W. Cubitt about 1818 devised the construction by which this form of employment was first practically carried into effect. The Prison Act, 1865, requires that every male adult prisoner over sixteen years of age sentenced to hard labour shall during at least three months of his sentence be employed on labour of the first class, namely, crank, capstan, tread-wheel, stone-breaking, or other like kind of bodily labour. The minimum period was by the Prisons Act, 1877, reduced to one month.

The tread-wheel consists of a hollow cylinder of wood on an iron frame, and revolving on an iron axle. The cylinder is usually about 5 to 6 feet in diameter, and on its outer circumference are steps about 7½ inches apart. The weight of the prisoners coming on these steps in succession causes the wheel to revolve. By means of suitable gearing this power may be transferred and utilised for grinding corn, pumping water, and other purposes. The speed of the wheel must be regulated by some

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sort of brake which may be applied by means of a 'governor.' According to the present practice, the speed is such that the prisoner ascends at the rate of 32 feet per minute. They are kept at this work for 6 hours in each day, divided into two periods of three hours each; and during each of these periods they are on the wheel for spells of 15 minutes, and then resting for 5 minutes. A prisoner, therefore, ascends 8640 feet per diem. In order to prevent intercourse between prisoners, wooden partitions are placed so that each of them works in a separate compartment, and each compartment has a handrail by which the prisoner steadies and partly supports himself while the wheel is moving, and while mounting or getting off it.

The crank is sometimes substituted for the tread-wheel as a means of enforcing hard labour. It has the advantage that the prisoner can work it in his cell. The prisoner turns a handle as in raising a bucket from a well, the handle causes a wheel to revolve, and the resistance to be overcome may be derived from a brake fitted on the wheel, or from mill machinery applied to grinding corn, pumping water, turning saws, or other purposes. The crank, when applied to overcome the friction of a brake, is liable to the disadvantage that the pressure may vary excessively from the heat evolved in the friction, which causes the surfaces to swell and increase the friction, and various forms of crank have been devised to counterbalance this, the most successful being that of Mr Appold. The present practice is to limit the pressure to 12 lb.; and the prisoner is required to make in 6 hours 8000 or 10,000 revolutions, according to his strength, the number of revolutions being recorded on a dial. Before a prisoner is put to tread-wheel or crank labour, he is examined carefully by the medical officer to ensure his fitness for such employment.

Treason may be defined in general terms as an attempt to overturn the government established by law. In early times it was regarded entirely as an offence against the monarch in whom that government was personified, and this view is still apparent in the present state of the law. The foundation of the English legislation on the subject is the Statute of Treasons (25 Ed. III. sect. 5), 1352. Previous to that the law was vague. Murder, highway robbery, piracy, even charging the king wrongfully, were sometimes punished as treason. What was termed 'accroaching'—i.e. assuming or trespassing on royal power—also fell under this designation. The Statute of Treasons was passed to declare the law on the subject. It enumerated various acts which constitute the crime. These were compassing the king or queen's death, or that of the heir; seducing his wife or eldest daughter, or the wife of his heir; levying war against the king, or assisting his enemies; killing the judges whilst in the execution of their duty. A later age found this, as other mediæval acts, alike redundant and defective. There has never been any prosecution under some of its provisions, and many varieties of attacks on the state or its ruler did not come within its plain meaning. The judges gave a forced construction to the clauses, and thus widened their application; yet there was much fresh legislation. Under Henry VII. (1494) it was enacted that obedience to the king *de facto* but not *de jure* was not treason. Under Henry VIII. there were nine acts passed creating fresh treasons, but these were all swept away in the first year of his successor. Again, acts on the subject were passed under the Stuarts, and were in turn superseded by laws passed after the Revolution.

The provisions of the Statute of Treasons above mentioned still remain in force. It is to be noted that the offence consists in *imagining* the sovereign's death, and that it is proved by such overt acts as display the intention. As to levying war, this includes an attempt by force 'to compel the sovereign to change his measures or counsels, or to intimidate or overawe both Houses or either House of Parliament,' or an attempt 'by an insurrection of any kind to effect any general public object,' as, for instance, to pull down dissenting meeting-houses generally. Although the speaking of words expressing and imagining the king's death is not of itself an overt act, yet if written or accompanied by words of advice or command they constitute such an act. In treason every accessory is a principal traitor.

An act of 1848 provides a maximum punishment of penal servitude for life for those who shall be guilty of the treason felony of attempting to deprive the Queen of any of her dominions, or of making war against her. A previous act (1842) punishes by imprisonment and whipping those who shall strike or threaten the Queen. Insulting the sovereign, attempting to seduce soldiers, illegal drilling, and assisting at royal marriages to which the sovereign has not given consent are offences akin to treason. Offences against the state are called *high*-treason. It is distinguished from *petty*-treason—the murder of a husband by his wife, a master by his servant, or an ecclesiastical superior by his inferior. These crimes are now treated as other murders; and the term petty-treason was abolished in 1828. Formerly the trials for these were similar in many respects to those for the graver offence. Misprision of treason is knowledge of the principal crime and concealment thereof. It is still punishable with forfeiture of goods as well as imprisonment for life. Sedition (q.v.) is cognate to treason; Coining (q.v.) used to be dealt with as treason. See also PRÆMUNIRE.

At common law but one witness was required, but by an act of Edward VI. two witnesses were necessary, though they may speak to different overt acts of the same kind. This was often evaded in later practice before the Revolution. At the trial of Algernon Sidney (q.v.) in 1683 the want of one witness was supplied by a pamphlet found in the prisoner's study, affirming that the king was subject to parliament, and that 'we may therefore change or take away kings.' The accused must, before his trial, be furnished with a copy of the indictment, a list of witnesses and jury. For two centuries he has been allowed the assistance of counsel, a privilege not granted to those accused of felony till very recent times. Also the trial must take place within three years of the commission of the alleged offence, unless it be the attempted assassination of the king, in which case the prisoner shall be tried in the same manner as if charged with murder.

The punishment for high-treason has always been death. In its old savage form, first inflicted in 1284 on the Welsh prince David, and on Sir William Wallace a few years later, and in force till 1870, the sentence provided that the criminal should be drawn on a hurdle to the place of execution, be hanged but not till he is dead, be cut down and have his entrails torn out and burned before his eyes, and then be beheaded and quartered, his remains to be disposed of as the king should think fit (see DRAWING AND QUARTERING). That sentence was last passed (though not carried out) in 1848 on William Smith O'Brien. Women were burned alive, though the sentence might be commuted by the king to beheading, as in the case of Lady Alicia Lisle (q.v.). The punishment is now execution by hanging. The Act of 1870 prevented forfeiture of property on conviction for treason;

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but it is thought the Act of 1868, abolishing public executions, does not apply to those convicted of this crime. See Stephen's *Digest*, p. 45.

Law of Treason in Scotland.—After the Union (1707) an act (7 Anne, c. 21) was passed making the Scots law of treason the same as the English. Thus the prosecution is not at the instance of the Lord Advocate but on the presentment of a grand jury, and there is a petty jury of twelve who determine the guilt or innocence of the prisoner. Trial in absence or after death was also abolished. The traitor's property is still forfeited, as the Act of 1870 does not apply to Scotland.

In the United States, where the people as a community, and not any one individual, is sovereign, treason is necessarily confined to levying war against the state, or adhering to and giving aid and comfort to its enemies. It implies the assembling of a body of men for the purpose of overturning or resisting the government by force; but an assembly for deliberative purposes alone does not fall under the head of treason, since the law distinguishes between deliberation and—what is a distinct step beyond it—any act of war, even though the latter be the direct outcome of the former.

See Chitty, *On the Criminal Law*; Stephen, *Digest and History of the Criminal Law*; *State Trials*; Macdonald, *Treatise on the Criminal Law of Scotland.*

Treasure-trove is the finding of hidden treasure in the earth; the word treasure meaning coin, gold or silver plate, or bullion. According to Roman law, treasure found by a man in his own land belonged to the finder; if found in the land of another, half was given to the owner of the land and half to the finder. By the law of England he who finds such things hidden in the earth is not entitled to them, but they belong to the crown. This is an exception to the general rule, that he who first finds a thing, whose owner is unknown, is entitled to keep it; and accordingly the exception is construed strictly, so that if the coin, &c. is not hidden in and covered by the earth the finder, and not the crown, is entitled to it. If it is treasure-trove in the strict sense above described, then it is the duty of the finder to give notice to the crown; and to conceal it or appropriate it is an indictable offence, punishable by fine and imprisonment. In Scotland the rule is the same, and the finder is bound to inform the sheriff of the finding. It is not so generally known as it ought to be that the crown is in the practice of paying to the finder the value of the property, on its being delivered up; from misapprehension of this matter it is believed that many curious relics are lost by their finders consigning them to the melting-pot. In 1886 the Home Office gave notice that finders of treasure would be permitted to retain articles not required for any national institution, subject to a deduction of 10 per cent.; articles required for museums, &c. are paid for at their antiquarian value, less 20 per cent. In the United States treasure usually belongs to the state in which it is found; Louisiana adopts the rule of Roman law as stated in the French civil code.

Treasury, the central department of the British executive government. After the Norman Conquest a separate board was appointed for revenue matters on the model of the Exchequer of Normandy, and a royal treasurer was appointed. Odo, Earl of Kent and Bishop of Bayeux, was the first holder of the office, and the early treasurers were for the most part churchmen. The office was sometimes held along with that of Justiciar. The Lord High Treasurer was one of the great officers of state. So great was his political influence that James I. in 1612 thought it prudent to put the office into commission—i.e. to entrust it to a board of Lords Commissioners; since the death of Queen Anne no Lord High Treasurer has been appointed; the office has been always in commission. Similar offices existed in Scotland and Ireland. The Treasury Board now consists of four Lords Commissioners and the 'Chancellor of the Exchequer,' an officer originally appointed to check the accounts of the Treasurer (see EXCHEQUER, CABINET). The First Lord (the lord whose name stands first in the commission) is a political officer of the highest rank; he has no departmental duties to perform, and his office is therefore usually assigned to the prime-minister. Since 1806 the head of the administration has always presided over the Treasury; but in 1886 Lord Salisbury undertook the department of Foreign Affairs, the leader of the House of Commons acting as First Lord of the Treasury. The three junior lords perform such duties as it may be convenient to assign to them; they are usually members of the House of Commons, and it is customary to appoint an Englishman, a Scotsman, and an Irishman. The Treasury Board is now no more than a name; formal documents run in the name of 'my lords,' but the working head of the department is the Chancellor of the Exchequer, who holds under a distinct patent the office of Under-treasurer. There are two secretaries, both of whom are usually members of parliament; the Financial Secretary is specially responsible for the civil service estimates; the Patronage Secretary conducts correspondence relating to appointments, and acts as chief whip of the ministerial party in the House of Commons. The permanent officials of the Treasury enjoy a high reputation for ability, and the traditions of the office are not to be disregarded even by the most enterprising Chancellor of the Exchequer. When the First Lord of the Treasury is himself Chancellor of the Exchequer he receives only half the salary of the latter office.

Since the Restoration it has been the established practice to keep the receipt of revenue separate from the expenditure of public money; but the Treasury exercises a general control. By an arrangement sanctioned by parliament in 1834, all public revenue is paid into the Bank of England to the credit of the Comptroller-general; this officer is in fact the pivot of the whole system; he checks all receipts and payments, and reports independently to the House of Commons. The Boards of Customs and Inland Revenue, the office of Woods and Forests, and the Post-office are under the authority of the Treasury. Estimates of expenditure in all the public departments are submitted to and revised by the Chancellor of the Exchequer, who is thus enabled to take a comprehensive survey of the resources and liabilities of the nation. Towards the end of the financial year he opens his budget in committee of the House of Commons, estimates the total expenditure of the coming year, and indicates the ways and means by which the required sum may be raised. Payments on account of the army, navy, civil service, &c. are made by the Paymaster-general on the authority of the Treasury. Under various statutes the Treasury regulates the salaries of newly-created officers in other departments, and fixes the number of officers employed in new departments. The duties of the Treasury also comprise the examination of the expenses of legal establishments, sheriffs, county courts, and criminal prosecutions. The Solicitor to the Treasury is a permanent official of great importance; his office is now combined with those of the Public Prosecutor and the Queen's Proctor. For a full account of the law relating to this subject, see Todd's *Parliamentary Government in England.*

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Treaty, in Public International Law, is an agreement or contract between two or more separate states, by means of which the jural relations subsisting between them are defined. As treaties are merely contracts, the rules for their negotiation, from a jural point of view, do not differ from those regulating the constitution of valid contracts in any other department of jurisprudence. Thus, in order to the validity of a treaty, the parties to it must be capable of contracting—a condition which renders void contracts entered into by protected states or members of a confederation when such contracts are in excess of the powers retained by these states; the agents employed must be duly empowered to contract on behalf of their respective states; the situation of the parties must be such that their consent may be regarded as having been freely given; and the objects of the agreement must be, physically and morally, possible and generally in conformity with law. No special form is prescribed by international usage as necessary for treaties. From the moment that consent on both sides is clearly established an obligatory treaty exists; but generally of course international contracts are, as a matter of prudence, consigned to writing. Sometimes treaties take the form of a specific agreement signed by both parties; but more frequently they take the form of a joint declaration or of an exchange of diplomatic notes. In practice the word treaty is commonly used for the larger political or commercial contracts, the term convention being applied to agreements on points of minor importance. When, as is usually the case, a treaty is entered into through the agency of official plenipotentiaries, it is necessary to its validity that it be ratified, either expressly or tacitly, by the supreme treaty-making power of the state. The constitution of each particular state determines in whom resides this supreme power of contracting treaties with foreign powers. In monarchies, whether absolute or constitutional, it is usually vested in the sovereign. In Great Britain the exercise of this power is subject to parliamentary censure; and ministers who advise the conclusion of any treaty which shall afterwards be judged derogatory to the honour or disadvantageous to the welfare of the nation are liable to impeachment, a proceeding of which English history affords numerous instances. In republics the chief magistrate, senate, or executive council is usually entrusted with the sovereign power. By the constitution of the United States the president prepares treaties; he discusses the conditions with foreign governments, and signs the treaty; but, over and above this, a sitting of the senate is required to approve the treaty, and no less than a majority of two-thirds in order to ratify it.

Concerning treaties, considered as sources of international law, there is a wide difference of opinion. Many Continental publicists regard treaties, or a certain class of them, as forming a sort of international jurisprudence; while on the other hand most British and American writers are disposed to lay small stress on them. Treaties assented to by all or nearly all civilised states, and avowedly making changes in the law, or laying down new rules, are important in proportion to the number of states which sign them. If they are accepted by all civilised states, or if, without this formal acceptance, the rules contained in them are tacitly adopted by many states, the treaties undoubtedly are sources of international law. Such treaties are rare, the Declaration of Paris in 1856 and the Geneva Convention of 1864 being the most conspicuous examples. Another class of treaties which form an important source of international law are those which are expressly declaratory of that law as understood by the contracting parties: e.g. the Protocol signed at the Conference of London in 1871 and the Three Rules of the Treaty of Washington in the same year. On the other hand, treaties signed by two or three states only, and stipulating for a new rule or rules as between the contracting parties, are evidence of what international law is not rather than of what it is. If, however, the new rule works well, and is gradually adopted by other states, it may win its way into the international code. Far the most numerous class of treaties are those merely settling some matter of dispute between the parties to them; these contain no rules of international conduct, and do not in any way affect international law.

Performance of the stipulations contained in a treaty used frequently to be secured by the taking of hostages. This is now in disuse, the treaty of Aix-la-Chapelle in 1748 being the last occasion upon which hostages were given, except in military conventions. The occupation of territory and the mortgaging of revenue have also often been used as modes of taking security. The most common means of securing the execution of a treaty is now through a treaty of guarantee by a third power. Treaties are interpreted according to practically the same rules as the contracts of private individuals. Collections of treaties are either general or national. The former class are made up of selections from the treaties of all nations; the latter include only the treaties to which a particular country was a party. The chief national collection of British treaties is that of L. Hertslet, librarian of the Foreign Office, continued by his son and successor, Sir Edward Hertslet.

Trebbia (anc. *Trebia*), a southern tributary of the Po, which rises in the Ligurian Apennines. Here Hannibal (q.v.) decisively defeated the Roman consul Sempronius, 218 B.C.

Trebelli, Zelia, opera-singer, was born of German parents called Gilbert at Paris in 1838, and made her début at Madrid under the name of Trebelli (? Gillebert transposed) in 1859. The next year she entered on a series of triumphs at Berlin, and in 1862 passed to London, where her success was also immediate. In the years that followed, marked by tours in Scandinavia, Russia, and the United States (1884), she held the position which she had at once assumed of the greatest mezzo-soprano of her day, winning applause equally on the stage or in the concert-room for her rich, brilliant voice and wonderful executive power, and for the marvellous range of expression that touched at one extremity an 'almost manly vigour' and at the other the most perfect womanly tenderness and delicacy. She died 18th August 1892.

Trebizond (Old Gr. *Trapezous;* mediæval Lat. *Trebisonda;* Turk. *Tarabzûn*) is the capital of a province in the extreme NE. of Asia Minor. The city is a flourishing seaport on the Black Sea coast, between the sea and the mountains; its importance being due to the fact that it stands on the great overland trade-route between Europe and Persia over the tableland of Armenia, though this trade has been much injured by the Batoum-Tiflis railway. It is surrounded by walls of great extent, which have numerous picturesque forts and enclose numerous gardens as well as the town itself. Outside the walls are various suburbs, where most of the Christian inhabitants reside, and in which the principal bazaars and khans have been established. The harbour is but a roadstead, not protected on the north-east, and vessels cannot come close inshore; but there is regular communication with Constantinople, the mouth of the Danube, and some Mediterranean ports. The pop. (50,000) comprises Turks, Armenians, Greeks, and Persians.

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The city is noted for its silk manufactures, which, however, are fast decaying. The old Greek city dates from 700 B.C., and was founded by a colony from Sinope. Conquered from Mithridates by the Romans, it rapidly rose in importance, became a free city, and was made by Trajan the capital of Pontus Cappadocius. On the capture of Constantinople by the Crusaders in 1204 one of the imperial Byzantine family, Alexis, established himself at Trebizond, where he had previously exercised the functions of governor, and founded a state known as the *Empire of Trebizond*, which stretched from the Phasis to the Halys, and maintained its independence against the Turks till 1462.—George of Trebizond (1396–1486), descended of parents from Trebizond, was born in Crete, but settled in Italy in 1420 as a teacher of rhetoric, Greek grammar, and philosophy.

Treble, the highest part in harmonised music, which in general contains the melody, and is sung by a Soprano (q.v.) voice. For the treble or G clef, see CLEF.

Tredegar, a market-town on the north-west border of Monmouthshire, 12 miles WSW. of Abergavenny and 7 ENE. of Merthyr-Tydvil. Grown from a mere village since 1800, it stands in the midst of a district rich in coal and ironstone, and is the seat of huge iron and steel works. Pop. (1851) 8305; (1881) 18,771; (1891) 17,484.

Tredgold, THOMAS, architect and engineer, was born at Brandon, near Durham, 22d August 1788. While apprenticed to a cabinetmaker, and while working as a carpenter in Scotland, he devoted his leisure time to the study of the principles of architecture and kindred subjects. From 1813 to 1823 he worked with his relative Mr Atkinson, architect to the Ordnance Board, and next commenced business on his own account as a civil engineer. He died 28th January 1829. Tredgold's scientific contributions to periodicals and also to the *Encyclopædia Britannica* range over a wide field; but his most valuable works are *The Elementary Principles of Carpentry* (4to, 1820; revised ed. by Hurst, 1871; and Tarn, 1886) and the *Strength of Cast Iron* (1821).

Tree, any woody plant of perennial duration, the natural habit of which is to rise from the ground with a distinct trunk, in contradistinction to Shrub, which naturally produces several stems more or less directly rising from the root. The terms are, however, somewhat arbitrary in their application. Trees are found in all climates except the coldest, but the number of species, as well as the luxuriance of the forests, is greatest in the tropics. As we advance towards the polar regions, or ascend high mountains, trees disappear before other forms of vegetation. The different characters of trees affect very much the landscape of the countries in which they grow; some countries, and particularly in northern parts of the world, being covered with sombre pine forests, whilst others abound in ash, beech, and similar trees of verdant foliage. Every kind of tree has its peculiar character, not only in its foliage, but in its general form and its mode of branching. An ash is as easily distinguished from an elm by a practised eye in winter when destitute of leaves as in the full foliage of summer. No acotyledonous plant assumes the character of a tree, except a few ferns known as Tree-ferns. See also ARBORICULTURE, GARDENING, TIMBER, TRANSPLANTING, WOOD; and for tree-worship, see PLANTS, p. 224.

In Law, trees and shrubs are fixtures, and on sale pass with the land to the purchaser. Except in nursery gardens, shrubs are reserved to the landlord. Even a lease of land with woods gives only the right of thinning plantations, cutting copsewood, and of cutting wood for repairing or building houses upon the ground, but not of selling wood. Injuries to trees are punishable at common law as malicious mischief.

Tree-fern, the common name for ferns with arborescent trunks, of which there are many species, all natives of tropical and subtropical countries. Their stems are formed of the consolidated bases of the fronds, surrounding a central column of soft tissue, in which the circulation takes place. In the landscape their columnar trunks, surmounted by graceful crowns of spreading fronds, have a similar

Tree-fern (*Cyathea dealbata*).

effect to the palms. The height to which they attain varies from 2 or 3 feet to 80 feet, according to the species. The Alsophilas and Cyatheas are the giants of the tribe. *A. excelsa*, a native of Norfolk Island, is stated by Captain King to grow to the height of 80 feet. Preserved in the British Museum is a trunk of *A. brunoniana*, an Indian species, which measures 45 feet. The pith or soft cellular matter in the centre of the stem of *A. excelsa* and *A. medularis*, the latter a native of New Zealand, is greedily eaten by swine, and when cooked resembles inferior turnips in taste and texture. Numerous species of tree-fern are cultivated in British conservatories.

Tree-frog (*Hylidæ*), a family of Amphibians, more closely related in structure to the Toads than

Tree-frog (*Hyla arborea*).

to the Frogs proper. The family is a large one, the typical genus Hyla alone including ninety-five species. Of these by far the greater number are peculiar to America; about twenty species are

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found in Australia and two in Asia, while only one (*H. arborea*) occurs in Europe. The tree-frogs show various interesting adaptations to their arboreal life. The last joint of each toe bears a claw, on which is supported a disc or sucker, by means of which the animal can cling to a perfectly perpendicular surface. Most of them also exhibit in a greater or less degree the power of colour-change. This power is seen most perfectly in *H. versicolor*, where the colour varies from a dark brown to a lichen-like gray or a brilliant green. The name tree-frog is often extended to Hylodes, a genus of the family Cystignathidæ, and to various species of Ranidæ, which are arboreal in habit, and are furnished with suckers like those of the true tree-frogs. In the male of the common tree-frog the skin of the throat may be distended into a resonant bladder, which greatly increases the sound of the creature's voice.

Tree-nettle. See NETTLE-TREE.

Trefoil, a name given to many herbaceous plants with leaves of three leaflets, as Clover (q.v.), Lotus (q.v.), Medick (q.v.), Buckbean (q.v.), &c. The term is used also in Architecture (for a three-lobed aperture in tracery) and in Heraldry.

Trefoil in Architecture.

Tregelles, SAMUEL PRIDEAUX, New Testament critic, was born at Falmouth, January 30, 1813. He was educated at Falmouth grammar-school, and spent some years as a private teacher, but from an early age gave himself to the study of the New Testament text, and at twenty-five formed the plan of a Greek New Testament on the principles which he afterwards carried out. In preparing for his *magnum opus* he visited the Continent three times in search of MSS., and spent five months in Rome, where he was allowed to see, but not to collate, the *Codex Vaticanus*. The first part appeared in 1857; the sixth, completing the text, in 1872. The seventh part, containing the *prolegomena*, appeared in 1879, edited by Dr Hort and A. W. Streane. Other works of this laborious scholar were the *Codex Zacynthius* (1861), and *Canon Muratorianus* (1868); an *Account of the Printed Text of the Greek New Testament* (1854), and *Remarks on the Prophetic Visions of Daniel* (1847). Besides these he edited *The Englishman's Greek Concordance*, and *The Englishman's Hebrew Concordance*, and translated Gesenius' *Hebrew Lexicon* (1847). Tregelles received a pension of £100 in 1862, which was doubled in 1870. In 1861 and again in 1870 he was stricken by paralysis, yet persevered in his labours with a noble fortitude. He was invited to join the New Testament Revision Committee in 1870, but was prevented from attending by ill-health. An earlier honour was the LL.D. degree from St Andrews (1850). Tregelles was of Quaker parentage, but in early life joined the Plymouth Brethren, from whom in later years he separated. He died on the 24th of April 1875.

Tréguier, a small port of 2763 inhabitants in the department of Côtes-du-Nord, Brittany, the birthplace of Renan.

Treinta y Tres, an eastern department of Uruguay (q.v.), washed by the Lagoa Mirim. The name was given to commemorate the *thirty and three* patriots who on 19th April 1825, after revolutionary meetings in Buenos Ayres, crossed the Plate and proclaimed a revolt against Brazil.

Trelawney, EDWARD JOHN, a venturesome Cornishman whose name is strangely linked with the names of Shelley and Byron, sprang from a famous and ancient family, was born in 1792, and entered the navy at eleven. Harsh treatment, together with a native spirit of insubordination, made him desert, and he is said next to have joined a privateer, and to have lived a life of desperate enterprises in the Indian and Malay Seas. In January 1822 he made the acquaintance of Shelley at Pisa, and it was he who took the chief part in the burning of the poet's body in August on the shore near Via Reggio. Next year he accompanied Byron to Greece, and there remained some time after Byron's death, attached to the fortunes of the chief Odysseus, who came to be more or less in open opposition to the government. Once while sheltering in the cave of Odysseus a treacherous Englishman shattered Trelawney's jaw with a bullet; but he, with characteristic magnanimity and though himself expecting death, saved the wretch from the vengeance of his men and sent him away in safety. Trelawney next travelled in North and South America, lived awhile in Italy, and spent his last years in Monmouthshire or Sussex, dying at his residence at Sompting near Worthing, 13th August 1881. His body was cremated, and the ashes carried to Rome and laid beside the graves of Shelley and Keats. Trelawney was a man of indomitable courage and generous to a fault, but restless, impatient, and completely impracticable. He had scarcely ever had an illness, to the last wore neither overcoat nor underclothing, took scarce any animal food, and was almost abstemious throughout his life. Remarkably handsome in youth, in old age his presence was no less striking. He sat for the old Arctic voyager in Millais's well-known picture, 'The North-west Passage.' Trelawney published two books, *The Adventures of a Younger Son* (1830; new ed. 1890), a vivid though ill-constructed story, based on the adventures of his own youth; and *Recollections of the Last Days of Shelley and Byron* (1858), re-issued in 1878 with considerable changes as *Records of Shelley, Byron, and the Author*. The importance of the latter is of course almost altogether relative; it reveals considerable power of insight into character, and betrays, as might have been expected, much greater sympathy for Shelley than for Byron.

Trelawney, Sir JONATHAN, from Westminster passed in 1663 to Christ Church, Oxford, and became bishop in turn of Bristol (1685), Exeter (1688), and Winchester (1707); he was one of the Seven Bishops (q.v.) tried under James II., and is the hero of R. S. Hawker's well-known ballad, 'And shall Trelawney die.' This was based on a contemporary refrain, the strong feeling aroused among the Cornishmen due rather to Trelawney's being head of an ancient Cornish house than to his being a bishop or even a martyr in a good cause. Trelawney died in 1721.

Tremad'oc Slates. See CAMBRIAN SYSTEM.

Trematodes, a class of flat-worms whose members are parasitic in or on a great variety of animals. The body is unsegmented, leaf-like, or more or less cylindrical, and provided with adhesive suckers. In one set, mostly cetoparasitic, the embryo develops directly into the adult sexual forms; of this 'monogenetic' life-history Polystromum (e.g. in the frog), Deplozoon (on minnows), Gyrodactylus (on various fresh-water fishes), Calicotyle (on rays), Aspidogaster (in the fresh-water mussel) are illustrative types. In another set, mostly endoparasitic in vertebrates, the embryo gives rise to one or more generations of non-sexual forms; of this 'digenetic' life-history the liver-fluke (Distomum), Monostomum, and Bilharzia are illustrative. All are hermaphrodite except Bilharzia, and self-impregnation is common. See FLUKE, BILHARZIA, &c.

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Tremella, a genus of Fungi, of the division Hymenomycetes, soft and gelatinous, mostly growing on decaying wood. In some places they receive such popular names as Witches' Meat, and an imaginary medicinal value has been ascribed to them.

Tremolite, one of the amphibole group of minerals. It is composed of silica, magnesia, and lime, and has a hardness of 5·5 to 6, and a specific gravity of 2·9 to 3. It occurs usually in long prisms, white or gray, vitreous, and translucent to opaque, but frequently appears as fibrous asbestos-like aggregates with a silky lustre. Tremolite is usually associated with crystalline schistose rocks, often occurring in the granular limestones, and sometimes forming the chief material of the so-called tremolite-schists.

Trench. See SIEGE.

Trench, RICHARD CHENEVIX, Archbishop of Dublin, belonged to an Anglo-Irish family of Galway, the Trenches of Woodlawn, and was born at Dublin, 9th September 1807. He passed from Harrow in 1825 to Trinity College, Cambridge, where he graduated in 1829. After a journey to Spain (its object to fight in the cause of liberty) and his ordination he was curate at Hadleigh, incumbent of Curdridge in Hampshire, and then for four years curate to Samuel Wilberforce, afterwards Bishop of Winchester; and during 1835–46 he published six volumes of poetry, which were favourably received, and which were re-issued as *Poems Collected and Arranged anew* (1865); the first of them was *The Story of Justin Martyr*. In 1845 Trench was presented to the rectory of Itchenstoke; in 1847 he became Theological Professor in King's College, London; in 1856 Dean of Westminster; and in 1864 Archbishop of Dublin, an office which he resigned in 1884. He died 29th March 1886, and was buried in the nave of Westminster Abbey. Trench's poetry was marked by sensibility and refinement, but not by genius. His theological writings laid his contemporaries under deep debt of gratitude, more for their tone and spirit than for originality or critical insight. And in the field of philology, while his interest was not in scientific problems for their own sake, he took pains to secure accuracy in his facts, and contrived to fascinate his readers with the 'fossil poetry and fossil history imbedded in language.' His principal works are *Notes on the Miracles* (1846; 12th ed. 1884), *Notes on the Parables* (1841; 15th ed. 1886), *The Lessons in Proverbs* (1853), *Hulsean Lectures* (1845; 5th ed. 1880), *The Sermon on the Mount illustrated from St Augustine* (1844), *Sacred Latin Poetry* (1849), *St Augustine as an Interpreter of Scripture* (1851), *Synonyms of the New Testament* (1854), *English Past and Present* (1855; 11th ed. 1881), *An Essay on the Life and Genius of Calderon* (1856), *Deficiencies in our English Dictionaries, Select Glossary of English Words* (1859), *The Study of Words* (1851; 15th ed. 1888), a memoir of his mother (1862), *Studies on the Gospels* (1867), and *Lectures on Mediæval Church History* (1877). See his *Letters and Memorials* (2 vols. 1886).

Trenck, THE BARONS. The cousins Franz and Friedrich, Freiherren (or Barons) von der Trenck, soldiers and adventurers, were descended from an ancient house of East Prussia. The elder, Freiherr Franz, was born at Reggio, in Calabria, on 1st January 1711, where his father was an Austrian general. When he was seventeen he received a commission as a cavalry officer, but he fought duels and indulged in such adventures that he had to flee in consequence, and went to Russia, where he was made a captain of hussars. Cashiered and imprisoned for insubordination, he returned to settle on his estates in Slavonia. At the outbreak of the Austrian war of succession (1740) he obtained from Maria Theresa permission to raise at his own cost a body of 1000 Pandours (q.v.), who, increased to 5000, formed the advanced guard of the imperial army in Silesia. But Trenck and his Pandours were even more distinguished for outrageous cruelty than for reckless daring; there had been no such monster, says Carlyle, since Attila and Genghiz. On the 7th of September 1742 he attacked Cham, a town in neutral territory, this act being, of course, in defiance of all law and discipline; and he completely annihilated it. After the battle of Sohr, in September 1745, he offered to capture Frederick the Great and bring him a prisoner to the Austrian camp. He failed in the enterprise, with great loss of men, but he secured the king's tent and much valuable booty. Suspicions were, however, entertained that he had allowed the king to escape, or even that he was in communication with the enemy, and he was tried by court-martial. He was imprisoned at Vienna, but made his escape with the assistance of a lady of rank; he was however captured, and condemned to life-long imprisonment in the Spielberg at Brünn, where he poisoned himself, 14th October 1749.

See his Autobiography (1748; new ed. 1807); the Life by Hübner (1788); a monograph, *Freiherr Franz von der Trenck* (3d ed. Celle, 1868); and Carlyle's *Frederick the Great*.

Freiherr Friedrich was born at Königsberg, 16th February 1726, the son of a Prussian major-general, and distinguished himself at the university. At sixteen he became a cornet in the guards; and two years afterwards he attempted some kind of intrigue with the Princess Amalia, and fell into disfavour. The discovery of a correspondence (itself innocent enough) with his Austrian cousin led to his imprisonment at Glatz, whence in 1747 he escaped to take service in the Austrian army at Vienna. Having returned to Prussian territory on family business, he was clapped in prison by Frederick the Great, and on his attempting to escape from the fortress of Magdeburg was heavily ironed—hands, feet, and waist. He was released on 24th December 1763, and afterwards settled at Aix-la-Chapelle, where he married the burgomaster's daughter, and went into business as a wine-merchant. He published his Memoirs in 1787. The book was translated into all languages, and Trenck became more famous than his famous cousin; several plays founded on his adventures were brought out on the French stage. In 1774–77 he had travelled in England and France, and the restless man received again his confiscated Prussian estate. But having gone to Paris during the Revolution, he was imprisoned by Robespierre as a secret political agent, and guillotined near the Barrière du Trône, 25th July 1794.

See Carlyle's *Frederick the Great;* Trenck's Autobiography (full of exaggerations, 1787); the Life by Wahrmann (1837); and the monograph, *Freiherr Friedrich von der Trenck* (3d ed. Celle, 1868). A complete edition of Trenck's collected works, containing his poems, was published in 8 vols. in 1786.

Trendelenburg, FRIEDRICH ADOLF, philosopher, was born at Eutin, 30th November 1802, and was for nearly forty years professor at Berlin, and a member of the Academy; he also sat as a Conservative in the Prussian Second Chamber. He died 24th January 1872. His principal works are *Elementa Logices Aristotelicæ* (1837; 8th ed. 1878; trans. as *Elements of Logic*, 1881); *Logische Untersuchungen* (1840; 3d ed. 1870); *Historische Beiträge zur Philosophie* (1846–67); and *Naturrecht* (1860). See the Memoir by Bratuschek (1873), and a work by Orphal (1891).

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Trent, a river of central England, the third in length, rising on Biddulph Moor on the north-west border of Staffordshire, and flowing south-east through Staffordshire, then north-east through the counties of Derby, Leicester, Nottingham, and Lincoln, till it unites with the Ouse to form the Humber, about 15 miles W. of Hull. It receives on the right the Sow, Tame, Soar, and Devon, and on the left the Blythe, Dove, and Derwent; passes the towns of Burton, Nottingham, Newark, and Gainsborough; and is about 150 miles long—navigable for barges to Burton (117 miles), for vessels of 200 tons to Gainsborough (25 miles). By canals it is widely connected with many of the great Midland manufacturing towns. See *The Rivers of England* (Cassell, 1889).

Trent, a small lake flowing by the Trent River into Lake Ontario. By this valley it has been proposed to connect the Georgian Bay of Lake Huron with Lake Ontario. The total length of the canal would be 197 miles; but the longer part of the course would consist of lakes and rivers.

Trent (Ital. *Trento*, Ger. *Trient*, Lat. *Tridentum*), a town of Austria, in the southern part of Tyrol, on the left bank of the Adige, in a beautiful and fertile valley, surrounded by high limestone hills, 145 miles by rail SSW. of Innsbruck and 59 N. of Verona. In its general aspect and architecture Trent is quite an Italian town; and with its spires and towers, ruined castles and ancient embattled walls, it presents an imposing appearance from a distance. It is surrounded by modern detached forts. The *Piazza Grande* is adorned with a splendid fountain of red marble, surmounted by a colossal statue of Neptune with his trident. The cathedral, begun in 1212, is a beautiful specimen of Lombard Romanesque, with a few features suggestive of the contemporary German style. The church of Santa Maria Maggiore (15th century) was the meeting-place of the famous Council. Among other public buildings are the seminarial church (formerly the Jesuits' church), ornamented with the richest foreign marbles; the theatre; the town-hall; some noble private mansions; and the Palazzo Buonconsiglio adjoining the town, a noble specimen of the feudal architecture of North Italy, now occupied as a barrack. Trent manufactures silks, wine, pottery, confections, and sugar, and has a brisk transit trade. Pop. (1880) 19,585; (1890) 21,653.

The ancient *Tridentum* or *Tridente* derived its name from the Tridentini, an Alpine tribe, whose capital it was. In 1027 its prince-bishops obtained the temporal rule of the valley of the Adige, and under them Trent rose to great prosperity. It became Austrian in 1803, and after much fighting was Italian from 1809 to 1813, when it was restored to Austria. It is still the see of a prince-bishop. The inhabitants are quite Italian in language and habits; and the restoration to Italy of Trent and the *Trentino* (district of Trent) is, with that of Trieste, the chief aim of the *Italia Irredenta* agitation in Italy.

The Council of Trent, generally reckoned as the eighteenth œcumenical council of the church, assembled at Trent, and sat with certain interruptions from December 13, 1545, until December 4, 1563. From the first outbreak of the Reformation a council of some sort had been called for by both Catholics and Protestants. Luther and his friends thought of one in which all Christians should be represented and the Scriptures accepted as the sole rule of faith. The emperor and many Catholic princes desired a council mainly for the reformation of abuses in ecclesiastical government and discipline, a reform, as the phrase went, 'in the head and members,' and to obtain certain concessions in doctrine and ritual, in the hope of conciliating Protestants and restoring to Europe religious peace. The pope and the Roman court, on the other hand, recognised in general the need of reform, and made sundry efforts in that direction, but for some time regarded the convocation of a council with undisguised aversion, from a well-grounded fear lest the emperor should dictate the subjects of debate and usurp the functions of the holy see, and partly lest the council itself should, in the spirit of some recent synods, presume to declare itself superior to the pope, and initiate reforms unacceptable to the Roman curia. It was the object of the popes, with or without a council, to more clearly define Catholic doctrine, pronounce the condemnation of the new heresies, strengthen the bonds of ecclesiastical unity, and consolidate the papal power. These conflicting aims and interests supply the key to the intricate negotiations which led first to the long delay in the meeting of the council, and subsequently to its several prorogations and suspensions, covering in all a period of more than forty years. Clement VII., who for ten years had resisted the pressure put upon him by Germany, at length, after an interview with the Emperor Charles V. in 1533, consented to call a council at Mantua or some Italian city. The Protestants now in their turn made difficulties, and insisted upon a freedom of debate and a reopening of closed questions which were incompatible with the traditions and principles of the Roman Church. Meanwhile England was lost to the pope, and Paul III. (December 1534), recognising that a council was inevitable, set himself earnestly to overcome all practical difficulties, indicted the council first at Mantua for May 1536, then at Vicenza, and again, without success, at Trent in 1542, until finally the council actually opened at the latter place, as has been said, December 13, 1545, the twelfth year of the pontificate of Paul, with four archbishops, twenty-two bishops, five generals of orders, and two ambassadors, under the presidency of three papal legates, the cardinals Del Monte (afterwards Julius III.), Cervini, and the Englishman Reginald Pole.

It was at once apparent that, though considerable freedom of speech was tolerated in the course of debate, the procedure of the council and its final decrees were under the immediate control and direction of the pope. Matters for deliberation could only be proposed by the legates, though this was a source of frequent complaint and contention; and the legates on all questions of difficulty awaited the pope's decision. The pope had desired that matters of doctrine should be dealt with first, while the emperor demanded that the council should begin with practical reforms. It was finally agreed that doctrine and discipline should be treated simultaneously in every session. The decrees were prepared in particular congregations, or select committees, afterwards more fully discussed and voted upon in general congregations, and finally proclaimed in public sessions. The position which the council was to take up with regard to the principles of the Reformation was soon made clear. In the fourth session, held April 8, 1546, sacred tradition, or the unwritten Word of God, was put on a par with Scripture, all the books contained in the Vulgate, including the so-called Apocrypha, were declared to be canonical, and the Vulgate version was pronounced 'authentic.' The important doctrine of Justification, which some of the bishops admitted to be comparatively new and to raise questions which the Schoolmen had not fully treated, was after much discussion laid down (sixth session, January 13, 1547) in terms which involved the emphatic condemnation of the

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Lutheran teaching, as well as of certain moderate views in that direction which had recently found favour within the Roman Church, and had been advocated by Cardinal Pole, who in the preceding October had resigned his legation on the plea of health. Discussions followed on original sin and the sacraments; but while the new heresies were explicitly condemned, care was taken not to close, without grave reason, any questions which divided the Thomists and Scotists or the orthodox schools of Catholic theology. Many ancient subjects of dispute, as, for example, the Immaculate Conception, were thus designedly left unsettled. One of the most prolonged of the party struggles which agitated the council arose at the earliest stage of its proceedings out of a discussion on the laws regarding episcopal residence. The Spanish bishops, who formed a strong minority, and who were at times supported by the French, were eager to strengthen the authority of bishops, and wished the council to define that episcopal jurisdiction was derived immediately from Christ and not through the pope. The Italians, supported by the legates in the interests of papal centralisation, were opposed to any such definition. It was not till towards the close of the council in 1563 that a decree, so worded as to leave the point in ambiguity, was accepted as satisfactory. Meanwhile the legates, seeing the emperor irritated by the action of the council, and his power much increased by the recent course of political affairs, had become anxious to transfer the council to a spot less open to his influence. An epidemic at Trent afforded a sufficient pretext for removing in March 1547 to Bologna. Certain bishops in the imperial interest remained at Trent, and for a time there was risk of a schism. The fathers at Bologna, however, abstained from publishing any decrees; and the few sessions there held related only to successive prorogations until in September 1547 the council was suspended *sine die*.

In February 1550 Julius III. succeeded to the papacy, and in the following year, May 1551, reopened the eleventh session of the Council at Trent under the presidency of Cardinal Crescenzio. It now sat for about twelve months, but in April 1552 the military successes of Maurice of Saxony led to another suspension. Meanwhile, in this second period of the council, the fathers had proceeded with the doctrine of the sacraments, and transubstantiation was defined. Certain Protestants now desired to be heard, and a safe conduct was accorded to their deputies, who were received in a general congregation; but their demands were considered impracticable, and the negotiations came to nothing.

Many years now passed, with little thought or opportunity of renewing the council. Meanwhile, the Emperor Charles V. had abdicated. Julius was succeeded by Cardinal Cervini, Marcellus II., and he in turn by the stern reformer Paul IV. (1555–59), who occupied himself mainly with the organisation and extension of the Inquisition. To Pius IV. (1560–66) belongs the credit of renewing the council, and, by his energy and tact, bringing it to a successful conclusion. This third period, in many respects the most important, begins with the seventeenth session, held in May 1562. Disciplinary decrees were passed regarding episcopal duties, the religious orders, the education of the priesthood, and the censorship of books. Clandestine marriages were by a new law made invalid. The odious office of questors of alms was abolished. Doctrinal decrees were issued on the mass, purgatory, the veneration due to saints, and the doctrine of indulgences.

During these last sessions (seventeenth to twenty-fifth) there were present at one time or another, besides ambassadors and theologians, 270 prelates, of whom 187 were Italians, 31 Spaniards, and 26 Frenchmen. The decrees of the entire council were confirmed, January 26, 1564, by Pius IV., who in the same year published the Profession of the Tridentine Faith, a brief summary of doctrines, generally known as the Creed of Pius IV. (see Vol. III. p. 555).

Several important works, recommended or initiated by the council, but which the fathers could not effectually carry out, were handed over to the pope for completion. Thus, the revision of the Vulgate, ordered at Trent in 1546, was finally completed under Clement VIII. in 1592. Pius V. founded the Congregation of the Index to carry out the work attempted but left unfinished by the council. The same pope also undertook the revision of the Breviary, and in 1566 published the *Catechism of the Council of Trent* (see Vol. III. p. 3).

The first important history of the council was written in a very hostile spirit by a Servite friar of Venice, Paul Sarpi (q.v.), whose book was published in Italian under a feigned name at London in 1619, and afterwards translated into English by Brent in 1640. The Jesuit, Cardinal Pallavicini, who had access to Vatican archives, wrote a refutation of Sarpi in his *Istoria del Concilio* (2 vols. fol., Roma, 1656). Le Plat, in his *Monumenta Concilii* (Louvain, 1781), printed a large collection of documents; to which must be added the *Acta Genuina*, printed by Theiner (1874) from the diary of Massarelli, the secretary of the council, and the *Sammlung von Urkunden* of Döllinger (1876). The best general history in English is that of the Rev. T. A. Buckley (Lond. 1852), who has also translated the *Canons and Decrees* (1851) and the *Catechism;* with which should be compared, on the Roman Catholic side, Waterworth's *Canons and Decrees*, &c. (1848). An interesting account of the debates within the council will be found in Mendham's *Memoirs* (1834), which includes the history of the synod under Pius IV. by Paleotto, the protonotary. See also Ranke's *History of the Popes;* Philippson, *La Contre-Révolution Religieuse au XVI^e Siècle* (1884); and Dejob, *De l'Influence du Concile de Trente sur la Littérature, &c.* (1884). And see ROMAN CATHOLIC CHURCH, TRANSUBSTANTIATION.

Trent Affair. In October 1861 Captain Charles Wilkes, U.S.N., intercepted at sea the British mail-steamer *Trent*, bound from Havana to St Thomas, and took off two Confederate commissioners accredited to France, senators Mason and Slidell, who were among her passengers. They were taken to Boston, and imprisoned in Fort Warren, but were released on January 1, 1862, on the demand of the British government, and suffered to proceed to Europe. The affair created intense excitement at the time, but Secretary Seward accepted Britain's demand as an adoption of the American doctrine which denied the 'right of search,' and on that ground replied that the prisoners would be 'cheerfully given up.'

Trente-un. See ROUGE ET NOIR.

Trenton, the capital of New Jersey, is on the Delaware River, at the head of tide-water and of steam-navigation, 57 miles by rail from New York and 34 from Philadelphia. It is a handsome city, divided into Trenton and South Trenton by Assanpink Creek, and with wide, straight streets, in the residence portions delightfully shaded. The public buildings include a commodious state-house, federal buildings, a county court-house, city hall, and state lunatic asylum, arsenal, penitentiary, reform school, and normal school. The Delaware, which is crossed by two fine bridges, is largely utilised for water-power. The industry chiefly identified with Trenton is the production of crockery and pottery, of which it is the principal centre in the United States; but there are other manufactures of scarcely less importance, including iron, steel, and zinc, rubber goods, fire-bricks, &c. On December 26, 1776, Washington here surprised 1500 Hessians,

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and captured nearly 1000, after crossing the Delaware during the night, amid blocks of floating ice and in the face of a fierce snow-storm. Pop. (1880) 29,910; (1890) 57,458.

Trenton Falls, a village of New York, on West Canada Creek, 17 miles by rail NW. of Utica, celebrated for its beautiful cascades (five, within a deep, narrow limestone ravine), with an aggregate fall of nearly 400 feet in 2 miles.

Trepan. See TREPHINE.

Trepang, the Malay name for species of Holothuria, principally *H. edulis* and *H. nigra*, much esteemed in China as a food delicacy. It passes also under the name of 'bêche de mer,' or sea-slug. The ordinary kind resembles a prickly cucumber; but they vary in colour when dried, being black, white, or red. There are no less than thirty-three different varieties enumerated by Chinese traders. It is gutted, boiled, split open, and smoke-dried. The average size is about 8 inches long, but some are found 2 feet in length. In the commercial form it is very hard and rigid, but when boiled down into a kind of gelatinous soup it is much esteemed. The fishing is carried on extensively on the northern coast of Australia, in India, Fiji, Tahiti, Macassar, Sumatra, and New Caledonia. Although there are so many varieties, only about five kinds have any great commercial value—viz. brown, large and small black, red, and white: these rank in importance in the order given. The average annual imports into China of trepang in the years 1889–91 were 45,000 cwt., valued at £235,000. It is only in China (where it is valued as an aphrodisiac) that this marine food-substance is appreciated; some is shipped annually from India to Hong-kong, and a little also from Japan.

Trephine. The instrument in its original form was like a carpenter's brace, and was called a *trepan*, from Gr. *trupaō*, allied to Lat. *tereo*, 'I bore.' The operation of trephining consists in the perforation of a bone, usually the skull, by means of a trephine, which is a small cylindrical or circular saw, with a centre-pin on which it works. It is practised on the skull in cases of fracture, chiefly when symptoms of compression or irritation of the brain are produced by depressed portions of bone, or by hæmorrhage beneath the skull; as a necessary preliminary to all operations on the brain—e.g. the evacuation of abscesses; for the removal of the focus of irritation in certain cases of epilepsy, &c., particularly where the disease has followed injury to the head; and even in rare cases for the removal of tumours. Trephining was known and practised in prehistoric times; some sixty skulls of the Stone Age that had been thus practised on are to be found in French archæological museums. Comparatively recently it was used almost as a routine treatment in severe head injuries; but it is now restricted to a very small proportion of such cases. The advance of knowledge of localisation of function in the brain, and the introduction of antiseptic methods in surgery have, however, extended its scope in other directions. It has recently been applied to the treatment of certain forms of idiocy and insanity, and in some cases with apparent benefit, at any rate for a time.

Trephine.

Trespass, in Law, is a physical interference with the person or property of another. However innocent the act, if it be voluntary, a legal wrong is done. Thus, if pursued by a wild beast you deliberately take refuge in another man's house, you commit a trespass; but if you rush there in mere blind fear, you do not. Again, if you drive in so careless a manner as to hurt any one, though unintentionally, this is a trespass. If animals or, indeed, any chattels are on a man's land doing damage, they may be seized and impounded till compensation be made. This remedy is called distress *damage feasant*. It is similar to distress at common law—e.g. there is no power of sale. If a dog worry cattle or sheep, the owner is liable since 1863. Formerly it was necessary to prove *scienter*—i.e. knowledge by the master of the animal's vicious disposition. *Scienter* must still be proved in other cases, and generally when animals, not savage by nature, do hurt—a legal doctrine quaintly parodied in the vulgar saying, that the dog is entitled to his first bite. Even in complete absence of real injury an action for trespass will lie, for, says Lord Denman, those rights are an extension of that protection which the law throws round the person. A verdict of a farthing damages is, however, the frequent and appropriate compensation for injury without damage (*injuria sine damno*).

As will be seen, there are various kinds of trespass: (1) trespass to goods, which consists in damaging them physically, as *asportation*—i.e. carrying them away; (2) trespass to the person, which is either battery, assault, or false imprisonment. Battery is an active attack on any one. Assault (q.v.) is an attempted battery; both are criminal offences as well as civil wrongs. False imprisonment is usually classed among the latter. It consists in depriving a man of his liberty without lawful excuse. Compelling any one to submit by the exhibition of superior force, though no actual violence be used, is a wrong of this nature. If a constable intervene, the question is, did he do so of his own initiative, or at the prompting of a third party? In the second case only, even if the arrest be illegal, can the third party be held liable for the false imprisonment. Trespass to the person may be justified on the ground that a man was acting in self-defence, that it was necessary to stop a breach of the peace, to apprehend a felon, or to assist police-officers in the execution of their duty, and that the person arrested was dangerous to himself and others. Various acts give power to arrest those found committing certain specified misdemeanours.

As regards trespass to land, since a plaintiff must succeed by the strength of his own, not by the weakness of his adversary's case, bare possession is a good title as against a wrong-doer; so the occupier may turn out an intruder, using, upon his refusal to depart peaceably, as much force as is necessary. If the possessor be forcibly turned out, he may forcibly re-enter, even though outer doors be broken open to effect the purpose. But this must be done immediately, otherwise the owner, though entitled to possession, will, if he use violence, render himself criminally liable under the statutes of Forcible Entry. In making a distraint for rent, or in levying an execution, but not in executing criminal legal process, it is a trespass to break open the outer door. Although the general rule is that any entry on another's land is a trespass, yet in certain cases of necessity an entry is excused—e.g. to abate a nuisance, or to prevent the spread of fire. A customary right of recreation or right of way will excuse what would otherwise be a trespass. Cut glass or spikes on a wall are allowable as a defence against intruders; but not man-traps

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or spring-guns (except inside a dwelling-house), at least since 1827. Even before that a trespasser could recover for damages so done to him, unless he had notice of the existence of the engines in question. The mere act of trespassing on another's land is not a criminal offence, but by statute it is when in pursuit of game, on railways, on places where explosives are stored or animals afflicted with contagious disease are confined. Besides the remedies for trespass—viz. forcible expulsion and an action for damages—an injunction may be granted, even for a bare trespass, since the Judicature Act of 1873. The law of the United States is based on the English law.

The term trespass, in Scots law, is borrowed from that of England. It is restricted to trespass to land. The law on the subject is generally the same as in the rest of the United Kingdom. The Trespass Act, 1865, provides a summary form of punishment for those who camp upon open land, or lodge in premises or enclosures without leave. Against mere trespassers an interdict may be obtained. See RIGHT OF WAY, POACHING, GAME-LAWS.

Trevelyan, SIR CHARLES, was born on 2d April 1807, the fourth son of the Archdeacon of Taunton, and was educated at the Charterhouse and Haileybury College. He entered the East India Company's service, and became assistant-secretary to the Treasury (1840–59), governor of Madras (1859–60, being recalled for his protest against new taxes proposed), and Indian finance minister (1862–65). He was created a K.C.B. in 1848, and a baronet in 1874; published several works on educational and philanthropic subjects; and died on 19th June 1886.—His son, the Right Hon. Sir GEORGE OTTO TREVELYAN, by his first wife, Hannah, Lord Macaulay's sister, was born at Rothley Temple, Leicestershire, on 20th July 1838. He passed from Harrow to Trinity College, Cambridge, and graduated as second classic (1861). In 1865 he was returned for Tynemouth in the Liberal interest, in 1868 for the Border Burghs, and he became a Lord of the Admiralty (1868–70), parliamentary secretary to the Board of Admiralty (1880–82), Chief-secretary for Ireland, as Lord Frederick Cavendish's successor, and a member of the Privy-council (1882–84), chancellor of the duchy of Lancaster, with a seat in the Cabinet (1884–85), and Secretary for Scotland (February to April 1886). Defeated then for his old constituency at the general election by a majority of thirty as a Unionist, in August 1887 he regained admission to parliament for the Bridgeton division of Glasgow as a Gladstonian, was re-elected in 1892, and was made Secretary for Scotland. He is author of *Horace at the University of Athens* (1861) and *The Ladies in Parliament* (1869), two brilliant Aristophanic skits; *Letters of a Competition Wallah* (1864); *Cawnpore* (1865); the admirable *Life and Letters of Lord Macaulay* (2 vols. 1876); and the *Early History of Charles James Fox* (1880).

Trèves (Ger. *Trier*), a city of Rhenish Prussia, lies on the right bank of the Moselle, in a lovely valley, between low vine-covered hills of ruddy sandstone, 69 miles by rail SW. of Coblenz and 111 SSW. of Cologne. The river is crossed here by an eight-arch bridge, 623 feet long, whose Roman piers date from 25 B.C. 'A quiet, old-fashioned town, Trèves,' Freeman says, 'has a body of Roman remains far more numerous and varied, if not individually more striking, than any other place north of the Alps can show.' These include the 'Porta Nigra,' 118 feet long, and 95 high, one probably of the five gates by which Trèves was entered in Constantine's time; the so-called Roman baths (more probably part of an imperial palace); and a basilica built of Roman brick by Constantine for a court of justice, but demolished in great measure to make room for an electoral palace in 1614. This, however, was removed, and the basilica fitted up for a Protestant church in 1856. Beyond the walls are the ruins of an amphitheatre that could seat 30,000 spectators; and 6 miles off is the 'Igelsäule' or 'Heidenthurm,' a monumental column, 71 feet high, sculptured with bas-reliefs of the 2d century. The cathedral of SS. Peter and Helena is an interesting structure of various antiquity, but chiefly in the early German Romanesque style of the 11th century. The most famous of its relics is the seamless or 'Holy Coat,' which consists of 'connected fragmentary particles of material.' Said to have been brought to Trèves by the Empress Helena, it is first referred to in 1106 by an anonymous monk, and was not a source of revenue till 1512. It was visited by nearly two million pilgrims in 1891, the first time of exhibition since 1844. A 'Holy Coat' is also shown at Argenteuil and in nineteen other places. Connected with the cathedral by a cloister is the beautiful Liebfrauenkirche (1243); and there is a library of over 100,000 volumes and many MSS., among them the 'Codex Aureus' of the Gospels, presented to the abbey of St Maximin by Charlemagne's sister, Ada. A university, founded in 1472, was suppressed in 1798. The industries comprise manufactures of woollens, cottons, and linens, besides a brisk trade in corn, timber, and Moselle wine. Pop. (1871) 21,442; (1891) 36,162.

Trèves, which claims to be 1300 years older than Rome, derives its name from the *Treviri*, a Gallic or, more probably, a Belgic people, who in Cæsar's time inhabited a large district between the Meuse and the Rhine. Their capital, *Augusta Trevirorum*, seems to have become a Roman colony in the reign of Augustus, and ultimately was the headquarters of the Roman commanders on the Rhine, and a frequent residence of the emperors, especially Constantine. Sacked by Attila in 451, it passed to the Franks in 463, to Lorraine in 843, to Germany in 870, and back to Lorraine in 895, and was finally united to Germany by the Emperor Henry I. The Archbishop of Trèves was, as chancellor of Burgundy, one of the Electors of the Empire, a right which originated in the 12th or 13th century, and which continued till the French Revolution. The last elector removed to Coblenz in 1786; and Trèves was the capital of the French department of Sarre from 1794 till 1814, since which time it has belonged to Prussia.

See German works by Haupt (1822), Leonardy (1871), Wilmowski (1874–76), Hettner (1880), Steinbach (1883), and Beissel (1888); also Freeman's *Historical and Architectural Sketches* (1876), and Clarke's *Pilgrimage to the Holy Coat of Trèves* (1892).

Treviranus, GOTTFRIED REINHOLD (1776–1837), and his brother, LUDOLF CHRISTIAN (1779–1864), two names eminent in the history of biology. See EVOLUTION, p. 481, and BIOLOGY, p. 156.

Treviso, the capital of an Italian province, on the Sile, 17 miles N. of Venice by rail. It has a Duomo dating from the 15th century, with pictures by Titian and Pordenone, the older Gothic church of San Nicolo, a public library (30,000 vols.), and a fine theatre. Pop. 18,301.

Trevithick, RICHARD (1771–1833), one of the pioneers of railway travelling. See RAILWAYS, p. 554, and the Life by Francis Trevithick (1872).

Trevor, SIR JOHN, born in 1633, in the parliament which met on 19th May 1685 was elected Speaker of the House of Commons. 'Trevor,' says Macaulay, 'had been bred half a pettifogger and half a gambler, had brought to political life sentiments

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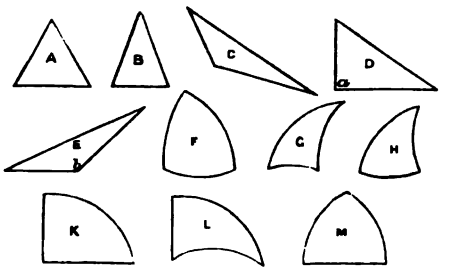
and principles worthy of both his callings, had become a parasite of Jeffreys, and could on occasion imitate not unsuccessfully the vituperative style of his patron. The minion of Jeffreys was, as might have been expected, preferred by James, was proposed by Middleton, and was chosen without opposition.' In the same year he was made Master of the Rolls. He contrived to maintain his political and judicial position after the revolution of 1688, and was re-elected Speaker in 1690, on an understanding with the government that he was to take the management of the bribery department. As first commissioner of the Court of Chancery, his integrity was greatly suspected; and though he was deficient neither in learning nor in parts, his greed and venality at length became notorious. In 1695 a committee of the House of Commons reported that in the preceding session Sir John Trevor had received 1000 guineas from the city of London for expediting a local bill. When it was moved in the House that the Speaker had been guilty of a high crime and misdemeanour, he had himself to put the question, and to declare that the 'Ayes' had it. A few days afterwards he was formally expelled. He still, however, retained the Mastership of the Rolls, 'to the great encouragement' says North, 'of prudent bribery for ever after.' He died 20th May 1717.

Trial. See CRIMINAL LAW, JURY. For Trial by Combat, see BATTLE (WAGER OF).

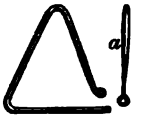
Triangle (*tres*, 'three,' *angulus*, 'a corner'), the most simple of closed geometrical figures, is a figure having three angles, and consequently three sides. It is, indeed, generally defined by geometers as a figure of three sides, and its property of being three-angled is put in the subordinate position of a necessary consequence. In plane geometry a triangle is bounded by three straight lines; and triangles are classed according to the relative length of their sides into *equilateral* (A), or equal-sided; *isosceles* (B), or having two sides equal; and *scalene* (C), or unequal-sided. Considered with reference to the size of its angles, a triangle is *right-angled* (D) when one of its angles (*a*) is a right angle (90°), *obtuse-angled* (E) when it has one angle (*b*) greater than a right angle,



Triangles.

and *acute-angled* (A or B) when it has no angle so great as a right angle. The triangle being the fundamental figure of plane geometry, through which the properties of all other figures have been arrived at, the investigation of its properties has always been held to be of primary importance. The simpler of these properties have of course long been known; but in modern times a whole system of geometry has grown up known as the geometry of the triangle, in which an endless number of remarkable properties are discussed. To the modern geometer the triangle connotes not merely the closed figure bounded by the sides, but the outside regions of space marked off by the sides produced to infinity. Of special importance also are those lines drawn through the angles which bisect these angles, or bisect or are perpendicular to the opposite sides. Then there are many interesting theorems connected with the inscribed, circumscribed, and escribed circles (see Casey's *Sequel to the First Six Books of Euclid*). The area of a triangle is half of that of a parallelogram which has the same base and altitude, and is thus equal to half the product of the base into the altitude. In the geometry of the sphere a triangle is a figure bounded by three arcs of circles (as F, G, H, K, L, and M). For triangulation, see ORDNANCE SURVEY, SURVEYING, TRIGONOMETRY; for triangular numbers, see FIGURATE NUMBERS.

Triangle, a musical instrument of percussion, formed of a steel rod bent in triangle-form, open at one angle, as shown in the figure. It is suspended by means of a string attached to the upper angle, and struck with a steel beater (*a* in figure). Many composers use it in their works as an adjunct to the drums, and it has a place in all military bands.



Triassic System. This forms the basement group of the Mesozoic or Secondary strata, and was formerly associated with the Permian System under the name of the New Red Sandstone. The term *trias* has reference to the threefold grouping of the system in Germany, where the strata are more fully developed than in Britain. In our area the system rests unconformably upon the upturned and denuded edges of the Permian and older Palæozoic strata. It is well developed in the central plains of England, whence a long belt extends north from Nottingham to the valley of the Tees, while another band stretches down the Severn valley into Devonshire. Small areas likewise occur in Dumfriesshire and near Elgin, and also in the north of Ireland. The system, however, assumes more importance in central Europe, where it occurs at the surface over a wide tract between the Thüringerwald in the east and the Vosges Mountains in the west, and between Basel in the south and Hanover in the north. North of that region it continues underneath overlying formations, but appears again and again at the surface where these latter are wanting. Trias is also met with in Heligoland and the south of Sweden. In all the regions now noted the strata appear to have been deposited in inland seas, and the following table gives the general succession of strata:

RHÆTIC.	Dark shales, red, green, and gray marls, thin gray limestones, sandstones, and bone-beds (Penarth Beds); and in Germany occasional thin coal-seams.
UPPER TRIAS or KEUPER.	Red, green, and gray marls and shales, and thin sandstones, with rock-salt and gypsum. Red sandstones and marls (England); gray sandstones, marls, and clays, with thin coal-seams (Germany).
MIDDLE TRIAS or MUSCHELKALK.	Limestones and dolomites, with associated beds of rock-salt, gypsum, and anhydrite. Not represented in England.
LOWER TRIAS or BUNTER.	Mottled red and green sandstones, marls, and conglomerates; with (in Germany) occasional beds of dolomite, rock-salt, and gypsum.

In the Alpine regions the Trias differs much from that of England and Germany. It attains a thickness of many thousand feet, and forms ranges of mountains. The lower division consists chiefly of fossiliferous limestones, the middle of shales, marls, limestones, and dolomites, while the Rhætic is built up mainly of limestones and dolomites. Thus in north-western and central Europe we have one well-defined type consisting of strata which have accumulated for the most part in inland seas, while in the Alpine regions the character of the

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beds betokens more open water. In France isolated areas of Trias occur, some of which approximate in appearance to those of England, while others resemble those of Germany. In Spain and Portugal both the German and Alpine types are represented.

In North America the Trias is well developed, as in Nova Scotia, Prince Edward Island, the Connecticut valley; the west side of the Hudson River, and south-west through Pennsylvania into Virginia; North Carolina. Strata believed to be of the same age cover wide areas in the western territories, extending from the eastern borders of the Rocky Mountains into Alaska, British Columbia, and California. Brick-red sandstones and marls are a prominent feature in all those areas. Like the similar rocks of Europe they contain few fossils, but animal tracks and footprints are of frequent occurrence. On the whole the American strata above referred to resemble the English type of the Trias. But on the Pacific slope, in Northern California and Mexico, the strata yield a plentiful marine fauna, and resemble the type of the Alpine Trias. Rocks of Triassic age have been recognised in Spitzbergen, in the Himalayas, and again in South Africa, in New South Wales, Victoria, and Queensland, where the series contains coal-seams.

Life of the Period.—The predominant plants were cycads (Pterophyllum, Zamites, &c.), horsetails (Equiseta), ferns, and conifers, especially the cypress-like Voltzia. In the red beds of the Trias few fossils occur, our knowledge of the life of the period (more especially the invertebrate life) being derived from the Rhætic, the Muschelkalk, and the marine strata of the Alpine Trias. Foraminifera, sponges, star-corals, and echinoderms were tolerably numerous. One of the most beautiful fossils is the lily encrinite (*Encrinus liliiformis*) of the Muschelkalk. Amongst Lamellibranchs Myophoria, Avicula, Pecten, Cardium were common forms. A number of Palæozoic genera of Gasteropods (Loxonema, Murchisonia, &c.) appear, commingled with newer forms. The same is the case with the Cephalopods, such old genera as Orthoceras, Cyrtoceras, and Goniatites occurring along with Ceratites and other species of the great tribe of Ammonites. This remarkable association of Palæozoic and Mesozoic genera is most notable in the Alpine Trias. In the same strata occur the earliest traces of dibranchiate cephalopods, represented by the internal bone or shell (Belemnites). The Triassic fishes are ganoids and placoids—the latter represented by spines and palate teeth (Ceratodus). Labyrinthodonts abounded, and are known chiefly through their footprints, which are often plentiful in the red beds of the Trias. Some of these creatures attained a large size—the skull of one (*Mastodonsaurus*) measuring over 3 feet in length by 2 feet in breadth. Lizard-like reptiles (Telerpeton, Hyperodapedon) were numerous, while crocodiles (Stagonolepis) made their first appearance. The same is the case with the extinct group of Dinosaurs—terrestrial reptiles, some of which could walk on their hind-feet, which were often only three-toed—their front feet being four-toed. The footprints of these Dinosaurs are very numerous in some sandstones, and the three-toed impressions were at first supposed to be those of birds. They vary in size, the largest being nearly 2 feet long. Swimming reptiles (Nothosaurus) have also been recorded from the Trias. Another remarkable group of reptiles were represented by Dicynodon, which had a horny beak and carried two large tusk-like teeth in the upper jaw. The Trias is further remarkable for having yielded the earliest relics of mammalia. They seem to have been small marsupials (Microlestes, Dromatherium), with some affinities to the little Banded Ant-eater of Australia.

Physical Conditions.—The British Triassic strata afford evidence of having, for the most part, been deposited in a great inland sea or salt lake, from the waters of which sodium chloride (rock-salt), gypsum, and other chemically-formed materials were precipitated. This inland sea covered a large part of England, and extended north into southern Scotland and across what is now the area of the Irish Sea into the north-east of Ireland. It is possible also that the same sea stretched into northern France. Another but smaller lake is indicated by the red sandstones of Elgin. The lands surrounding these lakes were clothed with cypress-like evergreens, and their shores were haunted by labyrinthodonts and various reptiles. The briny waters were unfavourable to life, and we have consequently few traces of any aquatic fauna, which seems to have consisted chiefly of small phyllopods (Estheria) and fishes. Eventually the lacustrine areas became largely silted up, and then subsidence of the land took place, so that the sea occupied some of the shallow depressions. In these marine tracts the Rhætic beds were deposited.

On the Continent during a large part of the Triassic period an inland sea extended westwards from the Thüringerwald across the Vosges country into France, and stretched northwards from the confines of Switzerland over what are now the low grounds of Holland and North Germany. In this ancient sea the Harz Mountains formed an island. In the earlier stages of the period the conditions resembled those that obtained in Britain, but the thick Muschelkalk with its numerous marine forms seems to indicate an influx of water from the open sea. Afterwards, however, this connection was closed, and the subsequent accumulations point to increasing salinity, during which chemical formations (gypsum, rock-salt, &c.) took place, while the marine fauna disappeared. Towards the close of the period, after the great inland lake had been largely silted up, a partial influx of the sea introduced a fauna comparable to that of the English Rhætic. It seems highly probable that the lands surrounding the inland lakes of central and north-western Europe were more or less dry and sandy regions, like the great wastes of central Asia. Many of the sandstones in the Bunter series of England are made up of grains so completely worn and rounded that they exactly recall the appearance presented by the wind-blown sands of desert regions. Some geologists therefore infer that in the earlier stages of the Triassic period large tracts of Britain were sandy deserts before the inland sea attained its greatest development.

The Alpine Trias, which is mostly marine, shows that, while continental and lacustrine conditions obtained in central and north-western Europe, an open sea existed towards the south—a Mediterranean of much greater extent than the present. From the fact that Triassic rocks with characteristic fossils occur within the Arctic regions, it may be inferred that the climate of the period was generally genial or warm.

Tribe, an aggregate of stocks—a stock being an aggregate of persons considered to be kindred—or an aggregate of families, forming a community usually under the government of a chief. The chief is possessed of despotic power over the members of the tribe, which is one of the earliest forms of the community among all the races of men. The discussion of the origin of tribes will be found in the article FAMILY; see also MARRIAGE, CLAN, and the articles on peoples, such as the American Indians, whose organisation is tribal (cf. IROQUOIS).

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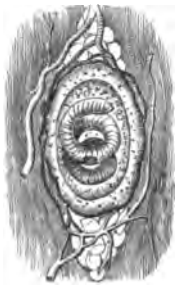
Tribonianus, a very eminent Roman jurist of the 6th century, of Macedonian parentage, but born in Paphlagonia. He held under the Emperor Justinian the offices of quæstor, master of the imperial household, and consul. But he is famous chiefly through his labours in connection with the Code (q.v.) of Justinian (q.v.) and the Pandects. Tribonianus died in 545.

Tribune. See ROME, Vol. VIII. p. 787.

Trichiasis. See EYE, Vol. IV. p. 516.

Trichina (*Trichina spiralis*), a minute parasitic Nematode, occurring in man, pig, rat, and also in hedgehog, fox, marten, dog, cat, rabbit, ox, and horse. The sexual forms are found in the intestine—the female nearly $\frac{3}{16}$ of an inch in length, the male about half as long. After impregnation the female brings forth numerous embryos viviparously, sixty to eighty at a time, and altogether about 1500, which bore through the wall of the intestine into the body-cavity or blood-vessels, and work their way, especially through connective tissue, to the muscle fibres, within which they grow, coil themselves spirally, and become encysted with a sheath at first membranous and afterwards calcareous. In these cysts, which may be sometimes present in millions, the young Trichinæ remain passive unless the flesh of their host be eaten by another—as by a pig eating a rat, and a man eating the pig. In the alimentary canal of the new host the capsule is dissolved, the embryos are set free, and rapidly developing become reproductive and migratory. The migrations of the young forms from the food canal to other parts of the body of the host produce disorders which are often fatal.



Trichina lying coiled up in muscle (magnified).

TRICHINIASIS, or TRICHINOSIS, is the name of the diseased condition which is induced by the ingestion of food containing *Trichina spiralis* in large quantity. It was first recognised as a distinct disease by Zenker in 1860; since that time a few cases have been met with in England, many in the United States, but most in Germany (largely on account of the common custom of eating smoked ham and uncooked), where epidemics have been not infrequent. For about a week the symptoms are those merely of the feverish state; but about that time the muscles begin to be painful and tender to the touch, and are found to be hard and swollen. Movements of the affected muscles are painful or even impossible; so that the limbs and jaws may be fixed, and the breathing may become hurried and shallow. In severe cases diarrhœa often occurs. When death takes place it is usually in the fourth or fifth week, either from exhaustion, intestinal irritation, or pneumonia. In some epidemics one-fourth or one-fifth of the cases are said to have proved fatal. Convalescence is usually very slow; three or four months may elapse before the health is restored. No means is known of destroying the parasites when they have reached the muscles; but when the disease is suspected castor-oil or calomel should be administered to expel as many of the embryos as possible from the intestines. Glycerine is said to be fatal to them, and to have been administered with benefit. But even infected meat is rendered innocuous by thorough cooking.

Trichinopoli, the capital of a district in Madras Presidency, with an area of 3561 sq. m., on the right bank of the Kaveri, 56 miles from the sea. At least seventeen villages and hamlets are included in the municipal limits. The fort, which includes the old town, is dominated by a mass of gneiss 273 feet above the level of the street. There are two temples upon it. The walls of the fort, which are now demolished, had a circuit of two miles, and this area is inhabited by a dense population. The moat has been laid out as a boulevard, and the Nawab's palace, which was restored in 1873, has been utilised for courts and offices. Beyond the walls is St John's Church, containing the tomb of Bishop Heber, who was buried here in 1826. The troops are stationed 1½ mile south of the fort. There are a market (1868), military hospitals, municipal hospitals, and an observatory. Cheroots are manufactured in large quantity, chiefly from excellent tobacco grown at Dindigal. Manufactures of hardware and jewellery, especially gold chains, are extensively carried on. A railway to Madras was opened in 1875, while there is connection south to Madura. It has two railway stations. It is the residence of a Roman Catholic bishop, with a Catholic college affiliated with Madras University; and the Lutherans, Wesleyans, and the Society for the Propagation of the Gospel have missions. Pop. (1881) 84,450; (1891) 90,730.

Tricolor. See FLAG, Vol. IV. p. 664.

Tricoupis, SPIRIDION, a modern Greek statesman and writer, was born at Missolonghi, 20th April 1788. He served as private secretary to Lord Guilford in the Ionian Isles, but took his place amongst the patriots on the outbreak of the war of independence. From 1821, except during the presidency of Capo d'Istria, he was continually employed in administrative and diplomatic business, was thrice sent to London as envoy-extraordinary, was minister of foreign affairs and of public instruction (1843), vice-president of the senate (1844–49), and envoy-extraordinary to Paris (1850). He died February 24, 1873. His speeches were collected at Paris (1836). Notable also are his poem on the Klephts (1821) and his *History of the Greek Revolution* (1853–57).

Tricuspid. See HEART.

Tricycle. See CYCLING.

Tridacna. See CLAM.

Trident, a three-pronged fork used by fishermen, is employed as the attribute of Poseidon (Neptune), and is frequent on coins of such Greek states as had Poseidon for patron deity. The conventional figure of Britannia bears a trident as the symbol of sovereignty over the sea.

Tridymite, a mineral composed of silica, which occurs in various acid igneous rocks in the form of thin transparent six-sided plates, several of which are usually grouped together. It is very brittle, has a hardness of 7, and specific gravity of 2·25 to 2·33. The mineral occurs in cavities in the trachytes of many regions, as in those of the Siebengebirge, Mont Dore, Hungary, Euganean Hills, Ireland, Iceland, Mexico, &c. It is also met with scattered through the ground-mass of trachytic rocks, as at Kosemütz in Silesia, Kaschau in Hungary, Hüttenberg in Carinthia, &c.

Triennial Acts. See PARLIAMENT, p. 776.

Trient. See TRENT.

Trier. See TRÈVES.

Trieste (Slav. *Têrst*), the most important seaport of Austro-Hungary, and the most considerable trading town on the Adriatic, stands at the head of the Gulf of Trieste, an arm of the Gulf of Venice, 370 miles by rail SSW. of Vienna. In 1849 it was constituted an imperial free city, and attached and belonging to it is a territory 36 sq. m. in extent. The city of Trieste, in which the population of the

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district is almost wholly massed, consists of the old town, the new town, or Theresienstadt, and two suburbs, Josefstadt and Franzenstadt. The old town, built on the slope of a steep hill, crowned by a castle (1508–1680), is distinguished by its narrow streets and black walls. It contains the cathedral, a Byzantine edifice built between the 5th and 14th centuries, into the walls of which stones bearing Roman inscriptions and carving have been built, and the tower of which is said to rest on the foundation of a temple of Jupiter. The new town, with broad streets built in regular parallelograms and handsome houses, occupies the plain that fronts the sea. Between these two divisions runs the *Corso*, the chief thoroughfare. The *Tergesteo* (1840), in the new town, is a splendid modern edifice, containing an exchange and reading-rooms, and the offices of the Austrian Lloyd's (see Vol. VI. p. 675). Trieste, which from 1719 till 1st July 1891 was a free port, has a very fine new harbour (1868–83). In 1890 there entered 7873 vessels of 1,471,464 tons, and cleared 7856 of 1,457,174. The manufactures are very extensive, including shipbuilding, rope-making, and the manufacture of soap, rosoglio, white-lead, leather, &c. A great agricultural exhibition was held at Trieste in 1882. Pop. (1810) 29,908; (1880) 144,844; (1890) 158,344, nearly all Catholics, and mostly Italian-speaking.

Trieste, the ancient *Tergeste* or *Tergestum*, was of importance under the Romans, and first receives historical mention 51 B.C., when it was overrun and plundered by neighbouring tribes. In 1382 it passed finally into the hands of Austria. It owes its prosperity chiefly to the Emperor Charles VI., who constituted it a free port, and to Maria Theresa. Since the year 1816 Trieste has borne the title of the 'Most Loyal of Towns.' Charles Lever and Sir Richard Burton were consuls here.

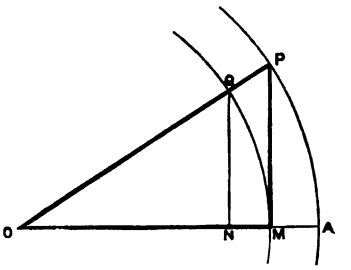
Trifolium. See CLOVER.

Triforium, the arcade over the arches of a church between the nave and side aisles. It is usually a dark gallery, being the wall-space against which the lean-to roof of the aisles rests. See GOTHIC ARCHITECTURE.

Triglyph. See ENTABLATURE.

Trigonocarpon. See CARPOLITES.

Trigonometry, originally the branch of geometry which had to do with the measurement of plane triangles. This gradually resolved itself into the investigation of the relations between the angles of the triangle, for the simple reason that all triangles having the same sets of angles are similar, so that if, in addition, one side is given the other two at once follow. It is easy to show from the Sixth Book of Euclid that, if we fix the values of the angles of a triangle, the ratio of the sides containing any one of these angles is the same whatever be the size of the triangle. This ratio is a definite function of the angles; and it is with the properties of such ratios that trigonometry has now to deal. The fundamental ratios are obtained from a right-angled triangle, of which one angle is the angle under consideration. It will suffice to show what these ratios are and how they have received their names. Let POM be the angle considered, PM being drawn perpendicular to OM. With centre O describe the two circles PA and MQ. The appropriate measure of the angle at O is the ratio of the subtended arc to the radius —i.e. either $\widehat{AP}/OP$ or $\widehat{MQ}/OM$ (see CIRCLE). This measure we shall adopt throughout, and shall represent it by the symbol θ. If QN is drawn perpendicular to OM, then the ratio of any pair of sides of the triangle OQN is equal to the ratio of the corresponding sides of triangle OPM. All the possible ratios which can be formed are the so-called trigonometrical or circular functions of the angle θ. Thus the ratio PM/OP or QN/OQ is the *sine* of θ. It is evidently half the chord of the angle 2θ; and its value is numerically less than θ, because PM being less than the chord PA is less than the arc PA. Again, the ratio PM/OM is the *tangent* of θ. MP is, in fact, the geometrical tangent drawn from the one extremity of the arc MQ till it meets the radius through the other extremity. For a similar reason the ratio OP/OM or OQ/ON is called the *secant* of the angle θ. In the same way the ratios OM/OP, OM/PM, OP/PM are respectively the *sine*, *tangent*, and *secant* of the angle OPM, which is the complement of the angle POM. Hence these ratios, regarded as functions of θ, are called the *cosine*, *cotangent*, and *cosecant* of θ. For any given angle there are, then, six trigonometrical functions. It is obvious that these functions are mutually dependent. Indeed, if any one is given the other five can at once be calculated. For instance, the well-known relation $OM^2 + MP^2 = OP^2$ gives at once by dividing by OP^2



$$(\sin.\ \theta)^2 + (\cos.\ \theta)^2 = 1,$$

or, as it is usually written,

$$\sin.^2\theta + \cos.^2\theta = 1.$$

Then, again, the *cosecant* is the reciprocal of the *sine*, and the *secant* of the *cosine*. The *tangent* is the ratio of the *sine* to the *cosine*; and the *cotangent* is the reciprocal of the *tangent*. The sine and cosine are never greater than unity, and the secant and cosecant are never less than unity. The tangent is less or greater than unity according as the angle POM is less or greater than half a right angle.

Suppose OP to rotate counter-clockwise. Then as the angle AOP increases from zero to a right angle the sine evidently grows from zero to unity; while at the same time the cosine diminishes from unity to zero. Continuing the increase so that AOP becomes an obtuse angle, we find that the sine begins to diminish, and that the cosine begins to increase numerically but towards the left of O. In other words, the cosine becomes negative, and continues so until OP has completed three right angles. In the same way, as AOP passes through the value of two right angles and becomes re-entrant, the sine becomes negative, being thenceforward measured downwards until OP has made one complete revolution. After one complete revolution both sine and cosine, and also secant and cosecant, begin to go through exactly the same cycle of changes in magnitude and sign as at first. They are therefore periodic functions (see PERIOD), and their period is 2π or four right angles. The tangent and cotangent, however, go through their cycle of changes in half this period or two right angles. All possible numerical values of the functions are obtained in the first quadrant. It is therefore sufficient in constructing tables of the trigonometrical functions to tabulate for angles from 0° to 90° inclusive. For example, the angle 130° (90° + 40°) has the same sine as the angle of 50° (90° − 40°); and its cosine differs only by being negative. Of greater practical importance than

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the tables of the functions themselves are the tables of their logarithms. These are generally tabulated for every degree and minute of angle from 0° to 90°; and proportional parts are added by which is readily calculated the number corresponding to an angle involving seconds of arc.

The calculation of the functions and their logarithms is a sufficiently laborious task. It is generally effected by means of Series (q.v.), although the values for certain particular angles can be found by the simplest of arithmetical operations. Thus, the cosine of 60° is evidently $\frac{1}{2}$; sine 60° is therefore $\frac{1}{2}\sqrt{3}$; tangent 60° is $\sqrt{3}$; and so on. What might be called the fundamental series for the sine and cosine in terms of the arc are:

$$\sin.\ \theta = \theta - \frac{\theta^3}{1.2.3} + \frac{\theta^5}{1.2.3.4.5} - \frac{\theta^7}{1.2.3.4.5.6.7} + \ldots.$$

$$\cos.\ \theta = 1 - \frac{\theta^2}{1.2} + \frac{\theta^4}{1.2.3.4} - \frac{\theta^6}{1.2.3.4.5.6} + \ldots.$$

If we make all the signs in these two series positive we get two other functions of θ, which are called the hyperbolic sine and cosine of θ, and are written *sinh.* θ and *cosh.* θ respectively. Related to these functions there are the hyperbolic tangent, cotangent, secant, and cosecant; and they are connected by relations similar to, though not quite identical with, the ordinary circular functions. We may see, by adding the series with signs all positive, that the sum of the hyperbolic sine and cosine is the exponential of θ. Demoivre's theorem gives the corresponding equation for the circular sine and cosine (see DEMOIVRE, and QUATERNIONS). The reason for the names circular and hyperbolic may be partially indicated thus: The relation $\cos.^2\theta + \sin.^2\theta = 1$ may be put in the form $x^2 + y^2 = a^2$, which is the equation of a circle of radius a, referred to rectangular axes (see GEOMETRY). The equation of the rectangular Hyperbola (q.v.) is $x^2 - y^2 = a^2$, to which there corresponds the relation $\cosh.^2\theta - \sinh.^2\theta = 1$. The hyperbolic sines and cosines are really exponential functions, and are not periodic. They are of constant occurrence both in the higher analysis and in mathematical physics. To facilitate their use in calculation, tables have recently been constructed.

Besides the series given above, there are many others, some of which are particularly serviceable for calculating the values of the functions or the values of their logarithms. There are also the converse series, by which an angle is found in terms of one of its circular functions. One of the simplest, and at the same time most historically famous, of these is Gregory's series, which expresses an angle in ascending powers of its tangent. It is as follows:

$$\theta = \tan.\theta - \tfrac{1}{3}\tan.^3\theta + \tfrac{1}{5}\tan.^5\theta - \tfrac{1}{7}\tan.^7\theta + \ldots.$$

Of great importance are the addition formulæ which express any required function of the sum or difference of two given angles in terms of the trigonometrical functions of these angles. They are readily established for the circular functions by application of the elementary theorems of orthogonal projection. Similar formulæ hold for the hyperbolic functions. As plane trigonometry has to do chiefly with the solution of plane triangles, so spherical trigonometry is devoted to the discussion of spherical triangles. In navigation, geodesy, and astronomy the formulæ of spherical trigonometry are in constant use. The ordinary text-books on trigonometry do little more than present the subject in its practical bearings. An introductory study of the general theorems in analysis which have sprung out of the development of trigonometry will be found in Chrystal's *Algebra* (part ii.). It is impossible to make any progress in the higher mathematics without a thorough knowledge of the properties of the trigonometrical functions.

Trikhala, a town of Greece, in Thessaly, 40 miles W. of Larissa, is built on the slope of a hill, manufactures cotton and woollen stuffs, and has a large transit trade. The neighbouring plains, which are watered by the Salambria (anc. *Peneus*), are rich in fruits. Pop. (1889) 12,662. Trikhala, the *Trikka* of Homer, was celebrated for its temple of Æsculapius. It was ceded to Greece in 1881.

Trilobita, an order of fossil crustacea entirely confined to the Palæozoic rocks. They make their first appearance in the Cambrian, attain a great development in the Silurian, occur sparingly in the Devonian and the Carboniferous, and disappear finally in the Permian system. The dorsal surface of the body was covered with a calcareous shell or crust, which is usually trilobed longitudinally—i.e. the lobes extend from head to tail. This trilobed crust consisted of a cephalic shield, a variable number of movable body rings or thoracic segments, and a tail or pygidium, composed of a number of segments more or less anchylosed. The eyes were invariably sessile and compound, consisting of an aggregation of facets, covered by a thin cornea. The lenses are frequently well preserved, and in some species can readily be seen with the naked eye. Although usually faceted, yet in certain forms the eyes are smooth; while a few species had no organs of sight. The number of facets varies considerably. Thus, while in some types there are not more than fourteen facets, in others there are as many as 15,000 in each eye. The thoracic segments, which vary in number in the different types, were capable of more or less movement, and this to such an extent in some species as to allow of the animal rolling itself up like a hedgehog. Specimens showing the under surface are very rare, but the few which have been found show that the margin of the dorsal crust was turned under in the form of a more or less narrow 'doublure.' In the centre of this doublure in the cephalic region is attached the lip-plate or 'hypostome,' with which, as shown in one specimen, buccal organs (maxillary palpi) seem to have been associated. Other specimens have shown that all the segments of the thorax and tail carried jointed limbs, and that branchial filaments were also present. More recently Mr Walcot, by making thin sections of rolled-up specimens of trilobites, has greatly increased our knowledge of their under surface. He shows (in the case of Calymene) that the mouth, behind the lip-plate, was bounded by four pairs of jointed appendages, the basal joints of which acted as jaws; while the thoracic and pygidial segments each carried a pair of slender jointed legs. To the thoracic segments were likewise attached spiral gills, one row on each side; and probably branchial appendages were also attached to the bases of the thoracic legs. The sexes are believed to be indicated by variations in the breadth of the cephalic shield, and in the length of the cephalic and pygidial spines. The members of the order varied greatly in size, some species being scarcely larger than a pin's head, while others, like *Asaphus gigas*, attained a length of 18 inches, and even sometimes of 2 feet. The eggs of trilobites appear to have been deposited in clusters, but very little is known as to the larval condition of these curious animals. It is possible, as some think, that the young in many species may have been naked, but the dorsal crusts of minute larval forms have been met with, and it is not improbable that many so-called species may be only larval or transition forms of others. Trilobites appear to have swarmed on the muddy bottoms of Cambrian and Silurian seas, although they lived also in

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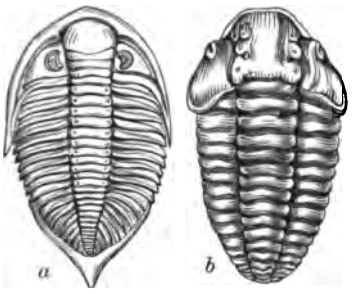
regions where only pure limestone was being accumulated. It is now believed that many of the peculiar markings seen upon the surfaces of Cambrian and Silurian strata, and some of which have been described as fossil plants, are really the tracks and trails of trilobites and probably other crustaceans. Some doubt exists as to the systematic position of Trilobita, but they are usually regarded by geologists as entomostracous crustaceans having relations to the phyllopods, but being more nearly allied to the Xiphosura (king-crabs). Hence some writers would include them under the Arachnida.



a, Phacops caudatus; *b*, Calymene blumenbachii.

Trilogy, the name given by the Greeks to a group of three tragedies, either connected by a common subject, or each representing a distinct story. A satyric drama was customarily added as a termination, whence the whole was sometimes termed a *tetralogy*. We possess only one perfect specimen of the classic trilogy—the *Oresteia* of Æschylus (q.v.), which embraces the *Agamemnon*, the *Chœphoræ*, and the *Eumenides*. Schiller's *Wallenstein* is a trilogy, and so are Swinburne's *Chastelard*, *Bothwell*, and *Mary Stuart*.

Trim, the county town of Meath, on the Boyne, 30 miles NW. of Dublin by rail, with imposing ruins of a 12th-century castle, the Yellow Steeple (125 feet) on the site of an ancient abbey founded by St Patrick, and a column to Wellington, who had his first schooling here. Close by are the ruins of Newtown Abbey and the Priory of St John the Baptist, and 5 miles down the river are the noble ruins of Bective Abbey. Pop. 1586.

Trimethylamine, $N(CH_3)_3$, incorrectly called propylamine, is an organic base resembling ammonia in some of its properties, and having a strong herring-brine odour. It is obtained principally by distilling herring-brine with lime. It has been employed with success, in doses of 10 to 15 drops, in the treatment of acute rheumatism.

Trimmer, MRS SARAH, was born at Ipswich on 6th January 1741. Her father was Joshua Kirby, a man of intelligence and piety, who in 1755 removed to London, and became tutor to the Prince of Wales, afterwards George III., in the science of perspective. Here his daughter met Dr Johnson, with whom she speedily became a favourite. In 1759 her father was appointed Clerk of the Works at Kew Palace; and here she became acquainted with Mr Trimmer (1738–92), who married her in 1762, and to whom she bore twelve children. It was not till 1780 that she came before the world as an authoress, by the publication of her *Easy Introduction to the Knowledge of Nature* —the first of nearly thirty volumes for the young, which, though now forgotten, with the exception of *The History of the Robins*, were excellently adapted for their purpose. She died quite suddenly on December 15, 1810. See her *Life and Writings* (2 vols. 1814).

Trimorphism. See DIMORPHISM.

Trimúrti (from the Sanskrit *tri*, 'three,' and *múrti*, 'form') is the name of the Hindu triad, or the gods *Brahman* (masculine), *Vishnu*, and *Siva*, when thought of as an inseparable unity, though three in form. When represented, the Trimúrti is one body with three heads—in the middle that of Brahman, at its right that of Vishnu, and at its left that of Siva. The symbol of the Trimúrti is the mystical syllable *Om* (q.v.).

Trinacria. See SICILY.

Trincomalee, a seaport, naval station, and magnificent harbour on the north-east coast of Ceylon, 110 miles NE. of Kandy. The town is built on a bold peninsula, which divides the inner and outward harbours. Here the Malabar invaders of Ceylon built the 'Temple of a Thousand Columns,' to which pilgrims flocked from all parts of India. This celebrated shrine was demolished in 1622 by the Portuguese, who fortified the heights with the materials derived from its destruction. It was next held by the Dutch, and subsequently by them and the French alternately, until the capture of Ceylon by the British in 1795. The modern town is in no way remarkable, and, with the exception of the official buildings (barracks, residences of civil, military, and naval authorities), makes a poor appearance, though there is a fine esplanade. The Bay of Trincomalee is landlocked, and presents a scene of tranquil beauty; the harbour is renowned for its extent and security; unlike every other in the Indian seas, it is accessible to every description of craft in every variation of weather, but unluckily it lies out of the course of trade, Colombo having in this respect a great advantage over it. There is an admiralty dockyard, and the fortifications have been strengthened. Pop. 10,180.

Tring, a market-town of Hertfordshire, on a spur of the Chilterns, 2 miles W. of Tring station, and 31 NW. of London. Situated near the Icknield Way and the Grand Junction Canal, it has a good church, and manufactures of silk, canvas, and straw-plait. Tring Park, built by Wren for Henry Guy (*c.* 1670), is the seat of Lord Rothschild. Pop. (1851) 3218; (1891) 4525.

Trinidad is the most southerly of the British West India Islands, being only 7 miles from the coast of Venezuela, the Gulf of Paria (an extremely safe anchorage) lying between. It is about 50 miles long, varying in breadth from 30 to 35 miles, and the area amounts to 1755 sq. m. Three ridges of mountains run east and west, one fringing the north coast and reaching an elevation of 3000 feet. The island has several tolerably large rivers. A remarkable phenomenon is a pitch lake near the village of La Brea, composed of bituminous matter floating on the surface of fresh water, about 3 miles in circumference, and 80 feet above the sea. The soil is very rich and productive. The climate is hot and moist, but not unhealthy; the mean maximum is 87·7°, and the mean minimum 70° F.; and the rainfall is about 74 inches. The chief town, Port of Spain, is one of the finest towns in the West Indies (pop. 33,782). There is another town called San Fernando (pop. 6335), with two or three pretty villages. The most important products are cocoa, sugar, rum, molasses, coffee, cocoa-nuts, tobacco, bitters, asphalt, and fruit (exported since 1889). The value of the exports reaches £2,310,000, and of the imports about the same figure. A third of the trade is with Britain, and a fourth with the United States. Pop. (1871) 109,638; (1881) 155,128; (1890) 208,030, mainly French (speaking a patois), with Spanish and English colonies, and many East Indian coolies. There are 54 miles of railway in the island, which with Tobago forms a crown colony, ruled by a governor, an executive council of four, and a legislative council of eighteen members. Trinidad

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was discovered by Columbus in 1498, but no permanent establishment was founded there until 1532 by the Spaniards. It suffered at the hands of the English (Sir Walter Raleigh in 1595), the Dutch (1640), and the French (1677 and 1690). In 1797 it first fell into the hands of the British, who were confirmed in possession of it in 1802.

See works by Daniel Hort (1865), H. A. Wickham (1872), L. A. A. de Verteuil (new ed. 1884), and J. H. Collins (2d ed. 1888), with others cited at WEST INDIES.

Trinidad, a small island in the Atlantic, in 20° 30′ S. lat., and 700 miles E. of the coast of Brazil, to which it belongs. It has been reported to contain pirates' buried treasure. See Knight's *Cruise of the Alert* (1890).

Trinidad, capital of Las Animas county, Colorado, on the Purgatory River, 210 miles by rail S. by E. of Denver, with mills and a trade in wool. Coal is found close by. Pop. (1890) 5523.

Trinitarians, a religious order founded at Rome in 1198 to redeem Christian captives from the infidels (see SLAVERY). Their rule was a modification of that of St Augustine, and from the red cross on the right breast of their white serge garments they were known as *Red* or *Crutched* Friars. They were bound to devote one-third of their total revenues to the work of redeeming the captives; in the 17th century they claimed to have redeemed upwards of 30,000 Christian captives. At the Reformation there were eleven houses in England, five in Scotland, and one in Ireland. The remaining houses of the order in Spain were suppressed in the reign of Isabella II.

Trinity, THE DOCTRINE OF THE, is the highest and most mysterious doctrine of the Christian religion. It declares that there are three Persons in the Godhead, or divine nature—the Father, the Son, and the Holy Ghost, and that 'these three are one true, eternal God, the same in substance, equal in power and glory—although distinguished by their personal properties.' The most elaborate statement of the doctrine is to be found in the Athanasian Creed, which asserts that 'the Catholic faith is this: That we worship one God as Trinity, and Trinity in Unity—neither confounding the persons nor dividing the substance—for there is one person of the Father, another of the Son, and another of the Holy Ghost. But the Godhead of the Father, and of the Son, and of the Holy Ghost is all one; the glory equal; the majesty coeternal.'

It is admitted that the doctrine is not found in its fully-developed form in the Scriptures; but it is believed to be clearly revealed in its elements in the New Testament, and also to be indicated in many of the statements and revelations of the Old Testament. The form of expression in speaking of God in the Old Testament Scriptures—the plural *Elohim*, coupled with a singular verb; the apparent distinction recognised in the revelations to the Patriarchs and Moses between Jehovah and 'the Angel of Jehovah;' the mode in which 'the Spirit' and 'Word' of God, and 'Wisdom' (Proverbs viii.) are spoken of; and the gradual unfolding of the doctrine of a 'Messiah,' have all been regarded as indications from the earliest times of the truth of a plurality of persons in the Godhead. In the New Testament Scriptures the doctrine is represented as clearly taught in the Trinitarian formula of baptism, the general character of the claims and prerogatives of Jesus Christ, especially the ascription to Him of the designation 'the Son of God,' and in the functions attributed to the Holy Spirit. The evidence is held conclusive of the equal divine nature and yet distinct personality of the Son and the Spirit along with God the Father. It is generally conceded, however, that the Christians of the 2d and even of the 3d century were far from having a clearly understood and recognised doctrine on this high subject. They were content for the most part to use scriptural expressions in speaking of the Father, and the Son, and the Spirit, without defining articulately their relation to one another. It was not till the progress of opposing heresies sought, on the one hand, to degrade the divine dignity of Christ, or, on the other, to confound the personality of Christ with God the Father, that the church was led to define in its Creeds, Nicene (325 A.D.) and others, the relation of the Son to the Father; the Christological controversies which led to the ultimate definition are discussed at CHRIST. The Constantinopolitan Creed (381) affirmed also the deity of the Holy Spirit; but this church doctrine of a Trinity of Persons was not fully completed till the addition of the *Filioque* clause in the Western Church of the 6th century, which led to the separation of the Greek Church from the Latin (see GREEK CHURCH, CHURCH HISTORY, CREEDS). The Western or Latin Church had less genius for such speculations, and, in so far as it meddled with them, imparted to them a coarser and more contradictory aspect—witness the so-called Athanasian Creed (q.v.). Strenuous assertion of the doctrine of the Trinity occasionally led to what was denounced as tritheism, or doctrine of three gods (so Philoponus in the 6th century). Roscellin was charged with tritheism by Anselm. Scotus Erigena taught a Neoplatonic heretical view; the mystic Richard of St Victor emphasised his view of Trinity as founded on love more than any mediæval teacher.

The Reformers clung to the doctrine as already formulated. Jakob Boehme developed a strangely mystical doctrine. Socinus and modern Unitarians are the most outspoken in their rejection of the doctrine of the Trinity, which has always been specially obnoxious to Deists and advanced Rationalists, and is little insisted on by Broad Church thinkers. Some speculative theologians and philosophers have refined away the Trinity into aspects of God's action rather than *hypostases* or persons as formerly understood. Clarke and the semi-Arians of the 18th century were not trinitarian in the full sense.

Tripartite divisions have had a special charm for philosophers from Plato to Hegel; to some of these the term Trinity has been applied. The Trimúrti (q.v.) is called the Hindu Trinity.

See the articles ARIUS, ATHANASIUS, SOCINUS, SPIRIT (HOLY), UNITARIANISM; the handbooks of systematic theology and histories of dogma; Waterland, Bull, and Pearson of the older English systematists; and especially Dorner's great works.

Trinity, a river of Texas, is formed by the union of two forks near Dallas, and runs 500 miles SSE. to Galveston Bay. It is navigable for steamboats for over 300 miles, except in the dry season.

Trinity House. Five maritime societies bear the name Trinity House, and are situated in London, Hull, Newcastle-on-Tyne, Leith, and Dundee. Probably all, or most of them, were originally partly religious and partly secular establishments founded by seamen, their chief original objects being probably mutual assistance and the care of aged and infirm seamen. From the 14th century onwards various public duties and privileges were assigned to them by royal charters or acts of parliament, such as providing lighthouses, buoying channels, and licensing pilots; and powers were given to them to levy dues on shipping or cargoes. With one important exception, these duties and powers have been reduced or withdrawn. Dundee House is now only a benefit society. Leith retains its public duties as a pilotage authority,

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as also do Newcastle and Hull, while the last also looks after the lighthouses and buoys of the Humber. All of them continue to give pensions, or homes and pensions, to members, and some assistance to destitute seafarers.

On the other hand, the London Trinity House, called the Corporation of Trinity House of Deptford Strond, is entrusted with the management of the general lighthouse and buoyage system of England and Wales, and with a supervising authority over local lights and buoys, and has besides a partial control over the lighting and buoyage systems of Scotland and Ireland. In 1514 this society was incorporated by royal charter of Henry VIII.; and its privileges were confirmed and extended by subsequent charters, particularly by that of James II. in 1685. In 1600 its first lighthouse was built at Caistow, after which date, as lighthouses increased in number, many of them fell into the hands of private individuals by lease, or patent, or act of parliament; but by 6, 7, William IV. chap. 79, private rights in lighthouses were compulsorily purchased by that Trinity House. After 1853 all light-duties, with those of the Scottish and Irish Lighthouse Boards, were paid to the paymaster-general, and went towards the formation of the Mercantile Marine Fund; and all disbursements for lighthouses were to be paid out of that fund after being approved by the Board of Trade. The Merchant Shipping Act of 1854 and subsequent acts laid upon the London Trinity House the additional duty of removing wrecks around the coast when dangerous to navigation. The power of the London Trinity House to appoint and license pilots was enlarged by the Merchant Shipping Act of 1854, and again in 1862. The Pilots' Fund and several special charities are administered by it.

The corporation of the London Trinity House consists of a master, a deputy-master, thirteen acting elder brethren, eleven honorary elder brethren, and an unlimited number of younger brethren. The master and honorary elder brethren are chosen on the ground of eminent social or official position. The younger brethren all belong either to the naval service or the mercantile marine, and are admitted by the court of elder brethren. The deputy-master and acting elder brethren are elected by the court of elder brethren from such of the younger brethren as are possessed of the qualifications of having obtained the rank of commander in the navy four years previously, or having served as master in the merchant service on foreign voyages for at least four years. The Board discharges its duties by means of committees and sub-committees for special purposes. Two elder brethren of Trinity House assist the Court of Admiralty at the hearing of every suit for collision, and occasionally in suits for salvage; but their duty is to guide the court by advice only.

Trinity Sunday, the Sunday immediately following Whitsunday, so called as being set aside for the special honour of the Blessed Trinity. The festival was not generally observed before the 12th century, though kept in Liége two centuries earlier; only in 1334 was it established by Pope John XXII. as a common festival of the whole Western Church. The mass and office peculiar to the day, however, are of greater antiquity.

Trinoda Necessitas, three species of contributions to which in Anglo-Saxon times all the lands of England, were subject—viz. *bricg-bot*, for keeping the bridges and highways in repair; *burh-bot*, for keeping the fortresses in repair; and *fyrd*, for maintaining the military and naval force.

Trio, in Music, a composition for three voices or for three instruments. The term is also applied to a movement in $\frac{3}{4}$ time in a different key, which follows a minuet or other movement, and leads back to the previous movement in the original key.

Tripe, parts of the compound stomach of a ruminant, especially of sheep or horned cattle, prepared as food. The parts used are the paunch or rumen (yielding plain tripe) and the smaller reticulum (yielding honeycomb tripe). See DIGESTION, Vol. III. p. 817.

Tripe de Roche, a name originally given to various species of lichens of the genera Gyrophora and Umbilicaria. They are nutritious, though bitter, nauseous, and purgative, and have been used as food by Canadian hunters and arctic explorers when better was not to be had.

Triple Alliance, the name by which various treaties are known: (1) A treaty concluded in 1668 at the Hague between England, Holland, and Sweden, having for its object the protection of the Spanish Netherlands and the checking of the conquests of Louis XIV. (2) An alliance concluded in 1717 between Britain, France, and Holland against Spain. (3) Between Britain, Russia, and Austria in 1795. (4) Between Germany, Austria, and Italy, formed and confirmed between 1883 and 1887. This superseded the 'alliance of the three emperors' (*Dreikaiserbund*) between William I. of Germany, Francis Joseph of Austria, and Alexander II. of Russia, 1872–84.

Tripoli (*Tarâbulus*), a province of the Ottoman empire, and the easternmost of the Barbary States of North Africa, stretching along the whole extent of both the greater and lesser Syrtes (the gulfs of Cades and Sidra), is bounded on the W. by Tunis, on the S. (very vaguely) by the Libyan Desert and Fezzan, on the E.—if we include the plateau of Barca (q.v.)—by Egypt, and on the N. by the Mediterranean Sea. The area is roughly estimated at 399,000 sq. m.; the number of the population, which is very mixed, can only be guessed, but is believed to be over 1,000,000—Libyan Berbers, Moors, and a few Arabs—with 3000 Europeans, chiefly Maltese, and 24,000 Jews. Tripoli is less mountainous than the rest of Barbary, for the Atlas range terminates here in a couple of chains running parallel to the coast and never exceeding 4000 feet in height. There are no rivers, and rain seldom falls during the long hot summers, but the heavy dew supports vegetation in favoured spots. The climate is extremely uncertain. The coast region (about 1100 miles in length) is very fertile about Tripoli and Mesurata, where all sorts of tropical fruits, grain, wine, cotton, madder, &c. are produced; but further east, along the shores of the Gulf of Sidra, reigns sandy desolation. The interior yields senna, dates, and galls, and the carob and lotus are indigenous. Sheep and cattle are reared in great numbers, and there is a hardy breed of small but excellent horses, besides strong and beautiful mules. The commerce of the country consists in exporting, principally to Malta and the Levant, the products of the country and of the interior of Africa (gold-dust, ivory, natron, and ostrich feathers), which are brought hither in caravans across the desert. The imports (which consist chiefly of European manufactures) have been declining gradually of late years, owing partly to the new direction which the trade of Central Africa is assuming, and partly to the abolition of the slave-trade, which has stopped the demand for many of the commodities that supported the traffic. Nevertheless Tripoli is still an important mart of the caravan trade with the interior.

Tripoli is subdivided into four *livas* or provinces —Tripoli, Benghazi (Berenice), Mesurata, and Gadames. The governor-general has the title, rank, and authority of a pasha of the Ottoman

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empire. He is appointed by the sultan, and in his turn appoints the *beys* or subordinate governors of the provinces; but many of the chief officers of state are nominated from Constantinople. The military force of the country consists of a body of Turkish soldiers, formerly about 3000, but increased in 1885 to 17,000 in number, whose business is to keep down insurrections, but who were formerly chiefly expert in creating them. The natives pay to the Turkish government, by way of tribute, a tenth of all the products of the soil; and there are, besides, the onerous special taxes on date-trees, &c. common to Mohammedan countries.

From the Phœnicians Tripoli passed into the hands of the rulers of Cyrenaica (Barca), from whom it was wrested by the Carthaginians. It next belonged to the Romans, who included it within the province of Africa, and gave it the name of *Regio Syrtica*. About the beginning of the 3d century A.D. it became known as the *Regio Tripolitana* (on account of its three principal cities, Œa, Sabrata, and Leptis, which were leagued together), and was probably raised to the rank of a separate province by Septimius Severus, who was a native of Leptis. Like the rest of North Africa, it was conquered by the Arabs early in the 8th century (see BARBARY), and the feeble Christianity of the natives was supplanted by a vigorous and fanatical Mohammedanism. In 1510 it was taken by Don Pedro Navarro for Spain, and in 1523 it was assigned to the Knights of St John, who had lately been expelled by the Ottoman Turks from their stronghold in the Island of Rhodes. The Knights kept it with some trouble till 1551, when they were compelled to surrender to the Turkish admiral Sinan (see Lane-Poole, *Barbary Corsairs*), and Tripoli henceforward joined in the general piracy which made the Barbary States the terror of maritime Christendom. In 1714 the ruling pasha, Ahmad Karamânlî, assumed the title of bey, and asserted a sort of semi-independence of the sultan, and this order of things continued under the rule of his descendants, accompanied by the most brazen piracy and blackmailing, until 1835, when the Porte took advantage of an intestinal struggle in Tripoli to reassert its authority. A new Turkish pasha, with viceregal powers, was appointed, and the state was made a vilâyet of the Ottoman empire, which it still remains. Several anti-Turkish rebellions have since taken place (notably in 1842 and 1844), but they have always been suppressed. The religious movement set on foot by the 'prophet' Senûsi in the middle of the 19th century is the most remarkable feature in the recent history of Tripoli. The first Senûsi died in 1860, and was succeeded by his son, who calls himself the Mahdi, and commands the devotion of a large following in northern Africa, much as did the better-known Mahdi in the Soudan (see SENUSSI). Of late Italy has sought to extend her interests in Tripoli.

Tripoli, probably the *Œa* of antiquity, called in Arabic *Tarâbulus*, or *Tarâbulus Gharb* ('Tripoli of the West'), is the capital of the foregoing province, and lies on the edge of the desert, on a point of rocky land projecting into the Mediterranean and forming a bay. It is a typical Moorish city irregularly built, surrounded by high bastioned walls and celebrated for its beautiful gardens. There are many mosques, besides several large churches. Pop. about 20,000. Though the majority of the inhabitants are Moslems, nearly all the trade is in the hands of Jews and Christians.

Tripoli (*Tarâbulus*, or *Atrâbulus*), a seaport of Syria, and capital of a province of the same name, is 40 miles NNE. of Beyrout, near the coast, and watered by a small stream, the Kadîsha. In and around the town are many remains of antiquity and traces of Saracenic architecture. Originally an important maritime city of Phœnicia, the ancient *Tripolis* was besieged and taken by the Crusaders in 1104, and retaken by the Mameluke Kalaûn in 1289. The old town having been laid in ruins by these sieges, a new one was built about 5 miles inland on a spur of the Lebanon range. It was famous in the middle ages for its fruit and gardens, its commerce and industries. The old harbour is small and shallow, and the trade has mostly shifted to Beyrout. Pop. 17,000.

Tripoli (Diatomite), a mineral substance employed in polishing metals, marble, glass, &c., so named because it was originally brought from Tripoli in Africa. It is a siliceous rock, composed of the siliceous frustules of Diatomaceæ. It is frequently soft, friable, and earthy, but now and then is rendered firmer and more solid, and even extremely hard, probably from impregnation with opal substance. The more dust-like varieties are called *Kieselguhr*, and are in much demand for the manufacture of Dynamite (q.v.). Kieselguhr has been met with in alluvial (generally lacustrine) deposits in many countries. It occurs in beds underneath peat in Britain, Norway, Germany, &c. Diatomaceous deposits are forming at the present day both in fresh water and in the sea: those which are worked for economic purposes ranging in age from Tertiary to recent times. Ehrenberg estimated that every cubic inch of Bilin Tripoli weighing 220 grains contained 41,000,000,000 of these minute water-weeds.

Tripolitza (officially Tripolis, 'three cities'), a town of Greece, under the Turkish rule capital of the Morea, 40 miles SW. of Corinth, in a plain 3000 feet above the sea. It is a comparatively modern place, and derives its name from being near the sites of the three ancient cities Tegea, Mantinea, and Pallantium. In 1821 it was stormed by the Greek insurgents, and in 1828 razed to the ground by the troops of Ibrahim Pasha. Pop. (1889) 10,698.

Tripos. See CAMBRIDGE, Vol. II. p. 667.

Triptych (Gr. *tris*, 'thrice,' and *ptyssō*, 'I fold'), a set of tablets consisting of three leaves, each painted with a distinct subject, but joined together by hinges, and capable of being folded so as to present a new face. The general character of such tablets has been explained under DIPTYCH (q.v.), the difference of name 'triptych,' 'polyptych,' being taken from the number of the leaves. In ecclesiastical use the diptych has been already explained as commonly meaning rather the register of names inscribed on the tablets than the tablets themselves. The triptych, on the contrary, generally speaking, contained sacred pictorial representations rather than written registers or records, and is extended to canvas pictures in three compartments. Famous triptychs are an altarpiece of the Van Eycks (q.v.) and the 'Descent from the Cross' by Rubens.

Trireme (Lat. *triremis*; Gr. *triērēs*), an ancient galley—especially a war-galley—having three banks of oars. Originally boats with one bank, then with other two banks of oars, were used. In the Persian and Peloponnesian wars triremes were the largest vessels employed; but at the time of Alexander we find that galleys with four and five banks had gradually come into favour. In the Punic wars the Carthaginians employed quinqueremes; and thenceforth the Romans constructed their war-vessels after the model of the Carthaginian quinquereme. At Actium Antony had nine and ten banked galleys. Under the empire the police of the seas was managed by smaller vessels, *liburnæ*; great war-ships were hardly required.

The banks of oars were elevated above each

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other, but not perpendicularly; the lowest rank of rowers having the shortest oars and easiest work. How the banks of rowers were arranged as to allow all to have a fair share of the work has never been satisfactorily explained. The trireme or quinquereme was also provided with a square sail, which was used when the wind was favourable for voyaging to relieve the labour of the rowers, but was not employed in action. In the earlier times victory depended more upon the number and valour of the soldiers on board than upon the skill of the seamen. Latterly the aim of each trireme was not as before to grapple with its opponent, but to dash with the greatest momentum possible with its beak against the enemy's vessel, and strike it amidship, or, at any rate, disable his banks of oars on one side. Fighting men were not so much wanted for these tactics. The crew then of an Athenian trireme consisted of about 200 men, of whom 20 might be sailors, nearly the same number marines, and the rest rowers. A contrivance for strengthening the prow of the trireme and increasing its efficiency as a ram gave the Syracusans their final victory over the Athenians in the harbour of Syracuse. The Romans preferred to grapple and fight hand to hand. See GALLEY.

Trisagion, or TRISHAGION (Gr. *tris*, 'thrice,' and *hagios*, 'holy'), one of the doxologies in use in the Greek Church which is repeated in the form of versicle and responses by the choir in certain parts of the liturgy. The words of the Trisagion are: 'O holy God, holy and mighty, holy and immortal, have mercy on us!' This doxology occurs in the Constantinopolitan and Syriac liturgies, in the Good Friday service of the 'adoration of the Cross,' and in the ferial prayers at Prime for penitential days.

Trismegistus (Gr., 'Thrice-greatest'), an epithet applied to the Egyptian Hermes; see HERMETIC BOOKS.

Trismus Nascentium. See TETANUS.

Tristan Da Cunha (often but erroneously *Tristan d'Acunha*), an island in the South Atlantic Ocean, with two smaller ones adjoining, lies midway between the coast of South America and the Cape of Good Hope, in 37° 6′ S. lat. It is about 21 miles in circumference, is rugged and precipitous, rising in a central conical mountain to 7640 feet. Discovered by the Portuguese in 1506, and named after the commander of the expedition, it was occupied by American sealers in 1790–1811. Formal possession was taken of the island in 1817 by a company of British artillery for the purpose of keeping a watch on Napoleon, at that time a prisoner in St Helena. On the death of Napoleon in 1821 the soldiers were withdrawn, with the exception of a corporal Glass and two companions, who, with some whaling men, were the founders of the present settlement. The colony flourished, and in 1829 numbered 27 souls; in 1873 there were 80, with 600 cattle and 600 sheep. In 1887 there were 97 persons in all, the population being kept almost stationary by migrations to the Cape. The settlement is in a fertile tract to the north-west, and is called Edinburgh. Property is practically held in common, and there is no strong drink and no crime, while the natives are healthy and long-lived. Nearly all the able-bodied men were drowned in December 1885 while attempting to board a vessel; and a grant of stores and provisions was passed by parliament for the use of the survivors in 1886. The oldest inhabitant acts as governor. During the American war the *Shenandoah* landed forty Federal prisoners here without providing for them. There is parcel post from St Helena as opportunity offers; and a ship of war pays the island an annual visit. Inaccessible Island, 20 miles distant, harboured two Germans of the name of Stoltenhoff, who underwent a kind of Robinson Crusoe experience there (1871–73). Nightingale Island lies 10 miles from Inaccessible Island.

Tristrem, or TRISTAN, the hero of a Breton or Cornish romance, originally unconnected with the Round Table cycle, although later interwoven with it. Tristrem was the love-child of King Mark of Cornwall's sister and Roland of Ermonie, and at fifteen repaired to Cornwall, where he charmed the whole court by his minstrelsy. He slew Moraunt in mortal combat, and lay ill three years of the wounds received, but was borne to Ireland, and there cured by Ysolt or Ysonde, daughter of the queen. On his return to Cornwall he told his uncle of the marvellous beauty of the Irish princess, and was sent to solicit her hand for him in marriage. Tristrem escorted Ysonde on her voyage to England; but both unwittingly drank of a love-potion intended for Mark, and from that day to the day of their death no man or woman could come between their loves. Ysonde was married to the king of Cornwall, but by the help of her clever maid, Brengwain, had many a secret interview with her lover. Tristrem was banished from Cornwall, but again brought to his uncle's court, and again their inevitable loves began anew. Next he wandered to Spain, Ermonie, Brittany, and here married another Ysonde—her with the white hand, daughter of Duke Florentine—but he could not forget his love for Ysonde of Ireland. Grievously wounded in battle, he sent a messenger to bring her to him. 'If you bring her with you,' he charged him, 'hoist a white sail; if you bring her not, let your sail be black.' Soon the ship is sighted, and Tristrem asks eagerly what is the colour of her sail. It was white; but Ysonde of Brittany, her heart filled with bitter jealousy, told Tristrem the sail was black, whereupon the heart-sick lover sank back and died. Ysonde of Ireland threw herself in passionate despair upon his body, and died heart-broken beside him. King Mark subsequently learned the story of the love-potion, and buried the twain in one grave, planting over Ysonde a rose-bush, and over Tristrem a vine, which grew up so inextricably intertwined that no man could ever separate them.

This romantic story is beyond a doubt of Celtic origin, but its intrinsic beauty early carried it widely across western Europe. It had very probably a mythological origin, and it recalls in more than one point the legend of Theseus. The oldest poem on the subject is that of *Béroul*, about 1150, extant only in a fragment. Several fragments of the story of the 12th and 13th centuries were edited by Francisque Michel (Lond. 1835). About the end of the 12th century Eilhard of Oberge composed his *Tristrant* (Strasb. 1877), the ultimate parent of many versions in later German *Volksbücher*. Gottfried of Strasburg's *Tristan und Isolde*, an unfinished poem of almost 20,000 lines, belongs to the first quarter of the 13th century. Soon after Gottfried's death his fine poem was feebly continued by Ulric of Türheim and Henry of Freiburg. The extant English poem, *Sir Tristrem*, dates from about the close of the 13th century. It was first edited by [Sir] Walter Scott in 1804; later by Eugen Kölbing (Heilbronn, 1882), and George P. M'Neill for the 'Scottish Text Society' (1886). Scott ascribed the authorship to Thomas of Ercildoune, and is followed by Mr M'Neill. In the 13th century also a Norse version was made, *Tristrams Saga ok Isondar* (edited by Eugen Kölbing, Heilbronn, 1878). We find allusions enough to the story in French *fabliaux*, in Dante, Petrarch, Boiardo, and Ariosto, in Chaucer, Lydgate, and Gower; in 1469 a prose romance on the subject

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of Tristan, son of King Meliadus of Leonnois was printed at Rouen, and was soon translated into German. The Spanish romance of *Don Tristan of Leonis* appeared at Seville in 1528; the Italian, *I due Tristani*, at Venice in 1555. It also became associated with the romances of the Round Table, and we find it in its place in Sir Thomas Malory's famous composition of these, the *Morte Darthur*. Hans Sachs worked the subject into a tragedy, and in 1588 a long poem on the love of Tristano and Madonna Isotta was printed at Venice. In 1841 appeared Karl Immermann's unfinished *Tristan and Isolde;* Wagner's operatic poem, which preserves all the essential points of the story, was first produced in 1859. A later work is the tragedy by Ludwig Schneegans (1865). In modern English poetry we have Matthew Arnold's poem, *Tristram and Iseult*, expressing exquisitely the pity of the story from the side of Iseult of Brittany; 'The Last Tournament' in Tennyson's *Idylls of the King*, closely based on Malory; and the *Tristram of Lyonesse* of Swinburne, a splendid poetic realisation of the theme.

See the Introductions to the editions of Eugen Kölbing and G. P. M'Neill; also Golther, *Die Sage von Tristan und Isolde* (Munich, 1887); vol. xxx. (1888) of the *Hist. littéraire de la France;* and *Romania*, vols. xv. and xvi.

Triticum. See WHEAT, and COUCH-GRASS.

Tritoma (*Flame Flower*), a genus of tufted herbaceous plants belonging to the natural order Liliaceæ. The leaves are all radical, long, narrow linear; the flowers are scarlet and yellow, very showy, densely racemose or spicate, the spikes in some species being ovoid, supported at the summit of a stout leafless scape. The perianth is tubular, six-parted, usually more or less depressed. The genus is best known in gardens by the name here given, but bears many synonyms, the earliest of which, Kniphofia, has recently been revived by botanists. There are about sixteen species, natives of South Africa and Madagascar. The species best known in British gardens is *T. aloides*, better known as *T. uvaria*, which is quite hardy in most parts of Britain, and is one of the most brilliant of border flowers in late summer and autumn. There are four or five other species in cultivation less hardy, but hardly less showy, where they may be successfully grown. Light, rich, well-drained soil suits them best; they are propagated by division of the crowns in spring as growth commences.

Triton, in Greek Mythology, a son of Poseidon and Amphitrite, who dwells with his parents in a golden palace at the bottom of the sea. He usually figures as an attendant on his father, a man in his upper parts with a dolphin's tail, and soothing the turbulent waves by blowing his shell-trumpet—his 'wreathed horn,' as Wordsworth calls it. The later poets speak of Tritons, in the plural, as a race of subordinate sea-deities, who are described by Pausanias as having sea-green hair and eyes, gills below the ears, human noses, broad mouths with the teeth of animals, scales on their bodies, and instead of feet a tail like that of a dolphin. Some have a dolphin's tail and horse's fore-feet (*Centauro-tritons*).—In zoology the name is given to the Newt, and to a genus of Gasteropods.

Triumph (Lat. *triumphus*) was the name given in ancient Rome to the public honour bestowed on a general who had been successful in war. It consisted in a solemn procession along the *Via Sacra* up to the Capitol, where sacrifice was offered to Jupiter. The victor stood in a chariot, drawn by four horses—his captives marching before, his troops following behind.

The *ovation* (from *ovare*, 'to shout,' 'exult'), or lesser triumph, differed from the greater chiefly in these respects, that the imperator entered the city on foot, clad in the simple *toga prætexta* of a magistrate, instead of with the *toga picta* and the *tunica palmata* of the more highly honoured commander, that he bore no sceptre, was not preceded by the senate and a flourish of trumpets, nor followed by his victorious troops, but only by the equites and the populace. The ovation was granted when the success, though considerable, did not fulfil the conditions specified for a triumph, or if the conqueror had not been in supreme command. For triumphal arch, see ARCH.

Triumvirate (Lat., 'a union composed of three men') is the name given in Roman history to the private league entered into between Pompey, Crassus, and Cæsar to carry out their own schemes of political aggrandisement, in spite of the opposition of the senate. The term is also applied to the division of government between Octavian (Augustus), Mark Antony, and Lepidus in the civil wars that followed the murder of Cæsar—an arrangement sanctioned, and therefore legalised by the senate. The former is usually called the *first*, the latter the *second* triumvirate. See ROME, and the articles on CÆSAR, POMPEY, and AUGUSTUS.

Trivium. See ARTS.

Trocar. See CANNULA.

Trochidæ, a family of gasteropodous molluscs of the order Pectinibranchiata. The shell is conical and spiral and more or less nacreous; the aperture is entire and closed by a thin horny operculum. In the genus Trochus the shells are top-shaped, and hence are popularly known as Top-shells. Many of the shells are extremely beautiful, and are used for adorning head-dresses, necklaces, &c., the outer layers being removed. There are a large number of British species, and a multitude of foreign and fossil forms. The Trochidæ are closely allied to the Turbinidæ.

Trochus.

Trochilus. See HUMMING-BIRD.

Trochu, LOUIS JULES, the defender of Paris, was born at Palais in Belle-Isle (Morbihan), 12th May 1815, and after the course at St Cyr entered the army at seventeen, and by his conduct and capacity rose rapidly in rank. He served as adjutant to Lamoricière, and to Bugeaud in Algeria; next to Saint-Arnaud and Canrobert in the Crimea, became in November 1854 general of brigade, and distinguished himself next year in the storming of the Malakoff. As general of division he fought at Solferino, and after the peace entered the Ministry of War, and was destined by Niel for his successor. But the unpalatable truths contained in his famous pamphlet, *L'armée Française en 1867*, in which he pointed out the rottenness of the imperial military system, and urged the adoption of Prussian methods, made him hateful to the court. At the outbreak of the 1870 war he received command of the 12th Territorial Division at Toulouse, and on the 17th August was named by the emperor governor of Paris, and after the proclamation of the republic became chief of the National Defence. He was cautious, timid, said the hotter spirits both within and without the circle of the doomed city; it is most probable that he saw only too well the hopelessness of his task. He laid down

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his office as governor, 22d January 1871, but remained president of the National Defence till the meeting of the National Assembly. He retired into private life in 1872. Works by him in his own defence are *Pour la Vérité et pour la Justice* (1873) and *La Politique et le Siége de Paris* (1874).

Troctolite (trout-stone), a variety of Gabbro (q.v.) composed almost entirely of white felspar (anorthite) and dark olivine. It is the 'Forellenstein' of the Germans.

Trœzen, a very ancient Greek city, capital of the south-east district of Argolis. It was the birthplace of Theseus (q.v.).

Troglodytes (Gr. *Trōglodytai*, 'cave-dwellers'), the name given by the ancient Greeks to various tribes or races of uncivilised men, who dwelt either in natural caverns or in holes which they had dug for themselves in the earth. They are mentioned by Strabo as existing as far west as Mauretania, and as far east as the Caucasus; but perhaps the best-known Troglodytes of ancient times were those of southern Egypt and Ethiopia. It was reported that they could not speak articulately, but shrieked or screamed like the lower animals. The chief occupation of the Troglodytes was herding cattle, though we also read that they were hunters and robbers. They are likewise mentioned as serving among the light troops in the army of Xerxes. Their habits of life were rude and debased; their drink was a mixture of milk and blood; they had a community of wives; and they killed the old men when unfit to tend cattle. Troglodytes are mentioned by Herodotus, Aristotle, and Diodorus, and seem to have been found also in Mœsia. The prehistoric cave-dwellers of Europe and more recent cave-dwelling peoples are noticed at CAVE.

Trogons (*Trogonidæ*), a family of birds of the order Picariæ, not very closely allied to any other group. They have the bill short, broad, notched or serrated, and with a wide gape; the feet small and weak, with the toes in pairs; but the first and second toes are turned backward, instead of the first and fourth—an arrangement unique among birds. The wings are short and somewhat pointed; and the tail is long and broad, often overhung by long tail-coverts. The plumage is soft, lax, and loosely attached to the very delicate skin; it is very beautifully coloured, some species being only excelled in brilliancy by the humming-birds. The females are less gorgeous than the males. The trogons inhabit the tropics of the old and new worlds; they are most numerous in South America, less so in the oriental region, and are represented in Africa by two species only. They are birds of moderate size, and sedentary and unsocial habits, inhabiting forests, where they sit motionless on branches, occasionally darting off to seize fruits or insects. They nestle in holes in decayed trees, laying two to four eggs, white or pale in colour. There are about fifty species, of which the most celebrated is the Quetzal, or Resplendent Trogon (*Pharomacrus mocinno* or *Calurus resplendens*), whose plumage is of a magnificent golden green, the centre tail-coverts of the male being nearly three feet long, though the bird is only of the size of a magpie. It inhabits Central America: Guatemala especially is the 'Land of the Quetzal.' See Gould's *Monograph of the Trogonidæ* (2d ed. 1875), and Brigham's *Guatemala* (1887).

The Quetzal (*Pharomacrus mocinno*).

Troilus and Cressida. See TROY.

Troitsk, a town of Russia, in the government of Orenburg, but on the Siberian side of the mountains, is 400 miles NE. of Orenburg, on the great road into Siberia. Pop. 18,497.

Troll. See DEMONOLOGY.

Trollope, the name of a family which has produced several eminent English authors.—MRS FRANCES TROLLOPE was a novelist and miscellaneous writer. Born in 1780, the daughter of the Rev. William Milton, vicar of Heckfield, Hants, in 1809 she was married to Mr Thomas Anthony Trollope, a barrister-at-law and fellow of New College. In 1829, her husband having fallen into straitened circumstances, she went to America; and during a three years' residence in the United States she amassed the materials of her first book, *Domestic Manners of the Americans*, published in 1832. This work attracted great attention, and the severity of certain of its strictures was much resented by Americans. From this time forward the literary activity of Mrs Trollope was nearly uninterrupted; novels of society and impressions of travel make up the sum of her works. Of her novels the most successful is, perhaps, *The Widow Barnaby* (1839), with its sequel, *The Widow Married* (1840), followed by *The Barnabys in America*. Mrs Trollope was a woman of strong talent, and her works are full of shrewd observation and true, if at times somewhat coarse, humour. They were popular in their day, and very well deserved their popularity; but already they are well-nigh forgotten. During the life of her husband Mrs Trollope resided chiefly at Harrow. During her later years much of her time was passed in Italy with her son, Thomas Adolphus; she died at Florence, 6th October 1863.

Her eldest son, THOMAS ADOLPHUS TROLLOPE, born on 29th April 1810, was educated at Winchester and Oxford, and in 1841 settled in Italy. He is favourably known by his *Girlhood of Catherine de' Medici*, *A Decade of Italian Women*, and a number of novels such as *La Beata*, *Marietta*, *Lindisfarn Chase*, *Gemma*, *The Garstangs*, *The Dream Numbers*. He has also written a *History of Florence*, the *Life of Pius IX.*, *Sketches of French History*, &c. His second wife, Mrs Frances Eleanor Trollope, is known as the author of *Aunt Margaret's Trouble* (1866), *Black Spirits and White* (1877), *That Unfortunate Marriage* (1888), and, with her husband, *The Homes and Haunts of the Italian Poets* (1881). See his autobiographical *What I Remember* (3 vols. 1887–89).

The third son, ANTHONY TROLLOPE, one of the most popular of recent novelists, was born 24th April 1815, and was educated at Winchester and Harrow. In 1841 he obtained a post as clerk to a surveyor of post-offices in Ireland. Here he acquired the fondness for hunting which never left him, married (1844), and began writing novels; and while filling more responsible official situations in the Post-office, he found, or made, leisure to amuse the public with a long series of novels, many of them of very remarkable merit. The *Kellys and the O'Kellys* (1848) was one of the first three novels he wrote, and like the other two fell dead from the press, although a graphic and accurate picture of the Irish life of the time. The first work which

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decisively drew attention, *The Warden* (1855), was followed by a continuation, *Barchester Towers*, which remains, perhaps, the cleverest of all his books. In rapid succession to these came *Doctor Thorne*, *The Bertrams*, *The Three Clerks*, *Castle Richmond*, *Framley Parsonage* (originally published in the *Cornhill Magazine*), *Orley Farm*, *The Small House at Allington* (contributed to the *Cornhill Magazine*), *Rachel Ray*, *Miss Mackenzie*, *Can You Forgive Her?* *The Claverings*, and *The Last Chronicle of Barset* (1867)—one of his best novels—besides many others. He was a zealous and valuable servant of the Post-office, and resigned his position as a surveyor (1867) three or four years only before he would have been entitled to a retiring pension, because he felt that his increasing literary work made it impossible for him, even with his extraordinarily unflagging industry, to discharge his official duties with efficiency. He wrote much for the magazines, and was the first editor of *St Paul's;* he once stood for parliament and was defeated. Post-office work had taken him to the West Indies, Egypt, and the United States; latterly he travelled in Australia and South Africa; so that he acquired materials for books in all these countries. Novels continued to be produced with astonishing regularity and frequency, according to a business-like method he has described in his autobiography. Amongst novels written subsequent to his resignation were *Phineas Finn* (1869), *Ralph the Heir*, *The Golden Lion of Granpère*, *Phineas Redux*, *John Caldigate*, *Ayala's Angel*, *The Fixed Period*, and *An Old Man's Love* (1884). Other works were a sketch of Thackeray ('Men of Letters' series, 1879), a Life of Cicero (2 vols. 1880)—a task for which his powers were inadequate—and a short Life of Palmerston (in 'English Political Leaders,' 1882). Trollope died 6th December 1882, and in 1883 appeared his interesting *Autobiography* (edited by his son, H. M. Trollope, who has also published novels and other works). Trollope sketches the superficial aspects of society with a charming lightness, and his works are unfailingly agreeable and amusing. Many of the portraits in the extensive gallery he has left us, especially of the residents in the cathedral close, are permanently fixed in the memory of all readers of English literature.

Tenor Trombone.

Trombone, a brass musical wind-instrument, whose title, originally Italian, signifies the great tromba or Trumpet (q.v.), to which instrument it forms the natural complement. It consists of a tube bent twice on itself, ending in a trumpet-shaped bell, and sounded by means of a cupped mouthpiece. The centre section (*a* in fig.) is double, the outer tube sliding on an inner one so as to permit of its being stretched to nearly double its own length. The performer, while holding the mouthpiece with the left hand, moves the slide out and in with the right hand by means of the cross-piece, *b*. The bass form of the instrument is provided with a jointed handle to enable the performer to reach the end of the slide. The trombone is, like the violin, a perfect instrument, being capable by means of the slide of any gradation of tone. Its notes are not fixed like the valved instruments, but made by moving the slide to varying distances, and consequently requiring a very correct ear on the performer's part. It has the usual open harmonic notes of the tube (see HARMONICS), the slide giving the complete chromatic scale. One great advantage it has over keyed or valved instruments—viz. all its notes are of the same quality; the moving of the slide does not alter its form as in the valved instruments, where every valve opens an extra convolution for the air to go through. It is of ancient but uncertain date, some authorities tracing it back to nearly 700 B.C. Specimens made of bronze, with gold mouthpieces, were discovered at Pompeii in 1738. When first introduced into England it was called sackbut. It has been much used in orchestral composition, and as a military-band instrument is unrivalled. To partly get over its difficulties a form with valves instead of the slide has been introduced, but its brilliancy is thereby destroyed, and its use is consequently declining. It has been made in almost every key, but the two principally used are the tenor in B♭ and the bass in G; and the music for them is written in the tenor and bass clefs respectively.

Tromp, MARTIN HARPERTZOON, a famous Dutch admiral, was born at Briel in 1597, went to sea as a child with his father, a commander in the Dutch navy, was captured off the coast of Guinea by an English cruiser, and compelled to serve over two years as a cabin-boy. In 1624 we find him in command of a Dutch frigate; in 1637 he was created lieutenant-admiral, with command of a squadron of eleven ships, with which he defeated a vastly superior Spanish fleet off Gravelines in February 1639. In the following October he defeated another fleet off the Downs, and captured thirteen richly laden galleons. But it was his conduct in the struggle with England that was to make the name of Tromp immortal. On May 19, 1652, with over forty ships, he encountered an English fleet of fifteen under Blake, and was worsted, with the loss of two ships. Tromp was for a while superseded in command by Ruyter and De Witt, but he was soon afterwards reinstated. On November 30, with eighty ships and a convoy of 300 merchantmen, he again encountered Blake in the Strait of Dover, and this time success was decidedly with the Dutch. The English fleet drew off, but it more than probably is a mere romance that Tromp now sailed up the Channel with a broom at his masthead, to denote that he had swept the enemy from the seas. At any rate that enemy was not long in returning. On the 18th of February 1653 Blake, together with Monk and Deane, engaged Tromp near Portland, and defeated him, though only after a contest memorable for its obstinacy. It lasted three days, at the close of which Blake had taken or destroyed nine ships of war and thirty merchantmen. Tromp fought with desperate courage, and brought off in safety the remainder of his convoy of 200 merchantmen. On June 2 and 3 following another terrific battle between Tromp and Deane took place off North Foreland, in which six Dutch vessels were captured, eleven sunk, and the remainder driven into Calais Roads. The final struggle of the war was his desperate battle with Monk, 31st July 1653, off the coast of Holland. The Dutch lost thirty men-of-war, but their greatest loss was the heroic Admiral Tromp, the victor in thirty-three sea-fights, killed by a bullet through the heart. He was buried at Delft. —His second son, CORNELIUS TROMP, was born at Rotterdam, 9th September 1629. His first service was against the Algerine pirates. Next he served under Van Galen in the Mediterranean, and became rear-admiral after the battle off Leghorn in which Van Galen fell (13th March 1653). On June 3, 1665, he shared the disgrace of Opdam's defeat by the Duke of York at Solebay on the Suffolk coast, but next year had an ample share of the glory of

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Ruyter's four days' fight (June 1–4) off the Downs. Two months later he was deprived of his command by Ruyter for a breach of duty, the result of his over-eagerness to pursue an advantage, but was reinstated in 1673 by the stadtholder William, and covered himself anew with glory in the bloody battles against the combined English and French fleets, 7th and 14th June. In 1675 he visited England, and was created a baron by Charles II. The year after he aided the Danes in their struggle with Sweden, and after his return home was appointed, in room of the dead Ruyter, lieutenant admiral-general of the United Provinces. He died at Amsterdam, 29th May 1691, and was laid at Delft in his father's grave. See Jacob de Liefde, *Great Dutch Admirals* (Eng. trans. 1873).

Trompe. See BLOWING-MACHINES.

Tromsö, a town of Norway, capital of the *amt* of Tromsö (the north-west part of the kingdom), on the eastern shore of the low, fertile island of Tromsö, which is nearly 5 miles long, and about 1½ mile broad. Pop. of island, 65,000; of town, 6000.

Tron or TRONE weight, the most ancient system of weight used in Scotland, the *trone* being a heavy beam or balance set up in the market-place, and employed for the weighing of heavy wares. The tron lb. contained 20 oz., but, from the custom of giving 'one in' to the score, was always reckoned at 21 oz.; this was the most general value; but it varied in the different market-towns between this and 28 oz. The later tron stone or standard weight contains 16 tron lb., each lb. 16 tron oz., and each tron oz. 16 drops; the tron lb. is estimated to be equivalent to 1·3747 lb. avoirdupois. The name survives in several Scottish churches.

Trondhjem (also *Throndhjem;* Ger. *Drontheim*), on the south side of the long and narrow Trondhjem fjord, at the mouth of the little Nid River, and 250 miles N. of Christiania by rail. It is built on undulating slopes, and has regular and broad streets, the houses being mostly of wood, though the building of new wooden houses is now forbidden by law. The (fortified) harbour is capacious, deep, and safe, but is difficult of entry. The most interesting building in the city is the venerable cathedral, a cruciform church dating partly from the 13th century, of English-Norman architecture, and unquestionably the most interesting ecclesiastical edifice in Norway. A great fire in 1530 destroyed most of the church except the richly adorned octagonal choir (late Gothic). The church, since 1818 the place of coronation of Norwegian kings, has been carefully restored since 1880. Portions of an old archiepiscopal palace (Kongsgaard) also survive. The town is the main emporium of a wide district of country, and has a large trade by sea and land; the exports include copper ore, herrings and other fish, train-oil, timber, &c. The ancient capital of Norway, originally called Nidaros, Trondhjem was founded in 996 by Olaf Trygvason, and became in 1152 the seat of an archbishop. Its decline dates from the Reformation. It was taken by the Swedes after a siege of nine weeks, and has often been nearly destroyed by fire. Pop. (1891) 25,051.

Troon, a seaport and watering-place of Ayrshire, 6 miles N. by W. of Ayr and 31 SW. of Glasgow. The harbour, undertaken by the Duke of Portland in 1808, and completed at a cost of more than half a million, is protected by a breakwater 1000 yards long. Golf-links were laid out in 1878; and Troon also has splendid sands and good sea-bathing. Pop. 2383. See Kirkwood's *Troon and Dundonald* (2d ed. Kilmarnock, 1881).

Troop, in Cavalry, a captain's command, consisting in the British army of two lieutenants, fifty-six mounted non-commissioned officers and troopers, and some twenty dismounted men when the regiment is at war strength. Two troops form a squadron, which is the manœuvring unit.

Troopial. See TROUPIAL.

Tropæ'olum, a genus of plants variously included by different botanists in the natural orders Tropæolaceæ and Geraniaceæ. It is numerous in species, all of which are natives of South America. They are annual or perennial herbs of trailing or climbing habit, having simple peltate leaves which are often peltately divided into several leaflets. The genus comprises the Great Indian Cress or Nasturtium (q.v.), *T. majus*, and the Small Indian Cress (*T. minus*), which are familiar in nearly every garden, along with the Canary-bird Flower or Canary Creeper (*T. peregrinum*), and many brilliant perennial species not so generally cultivated in Britain. The best known of the perennials is the Flame-flowered Nasturtium (*T. speciosum*), which, though introduced from its native country, Chili, so recently as 1846, is now one of the most frequent and brilliant ornaments of cottage walls throughout Scotland, particularly in the highland or northern districts, and also in North Wales. It is the envy of southern tourists, who carry roots of the plant home with them in the hope of establishing it in their own gardens, but rarely succeed. It requires peculiar atmospheric conditions to induce it to grow and flower freely; moderate exposure to light, such as would be afforded by a west aspect, high atmospheric humidity and cool nights, with deep moist but well-drained soil, are essential to its healthy growth. It is easily propagated by its creeping underground rhizomes. There are several other hardy and greenhouse perennials with tuberous roots in cultivation, all of a very ornamental character. The tubers of *T. tuberosum*, a native of Peru, are edible.

Canary Creeper (*Tropæolum peregrinum*).

Trophonius, in Greek legend, was the most skilful architect of his day, and was the son of Erginus, king of Orchomenus, or of Apollo. Along with his brother, Agamedes, he built the temple of Delphi and the treasury of King Hyrieus in Bœotia, which the two are said afterwards to have plundered. After his death he was worshipped as a hero, and had a celebrated oracle at Lebadeia (Livadia) in Bœotia. The votary who wished to enter the 'Cave of Trophonius,' in order to consult

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previously by purification and sacrifice, lay prone on his back, and put his feet into the cave, when he was caught by some unseen force, and violently pulled inside. Don Quixote, it will be remembered, once thought himself to have got there.

Trophy (Lat. *tropæum*; Gr. *tropaion*, from *trepō*, 'I put to flight') was a memorial of victory erected on the spot where the enemy had turned to flight. Among the Greeks (with the exception of the Macedonians, who erected no trophies) one or two shields and helmets of the routed enemy, placed upon the trunk of a tree, served as the sign and memorial of victory. After a sea-fight the trophy consisted of the beaks and stern-ornaments of the captured vessels, set up on the nearest coast. It was considered wrong to destroy such a trophy, and equally wrong to repair it. In early times the Romans decorated the buildings at Rome with the spoils of the vanquished. Of this practice we have a familiar instance in the *rostra* or beaks set up in the forum. In later times pillars and triumphal arches were employed to commemorate victories. Besides these, in modern times, the humiliation of an enemy is rendered lasting by such devices as the naming of many streets in Paris (Austerlitz, Jena, Magenta, Solferino, &c.), the Waterloo Bridge in London, the Sedan-festival in Germany, the Russian cannon set up in English towns, &c.

Tropic-bird (*Phaëthon*), a genus of birds of the family Phaëthontidæ. The bill is strong, pointed, and almost arched; the head completely feathered; the tail short; the four toes united by a web. In general aspect and size they closely resemble gulls or terns. They often follow in the wake of ships, and are known to sailors as 'Boatswains.' The two very long tail-feathers are in one species red and in the two other species

Tropic-bird (*Phaëthon æthereus*).

white. Their flight is very unlike the usual flight of sea-birds, its chief peculiarity being the rapid and constant strokes of the wings, more like a duck than a gull. Three species are known, all tropical, and often seen very far from land. They breed in cracks of cliffs or ledges of rock, but make no nest. The Common Tropic-bird (*P. æthereus*) is about the size of a partridge, white, with curved lines of black on the back; some of the quill-feathers black, tipped with white. It is found in the Atlantic Ocean. In the Indian and Pacific Oceans another species, the Red-tailed Tropic-bird (*P. rubricauda* or *phœnicurus*) appears, which is larger in size, of a deep roseate tinge, with red bill and the retrices and long feathers of the tail red. The Yellow-billed Tropic-bird (*P. flavirostris* or *candidus*) is the smallest in size; it breeds in Bermuda, and occurs numerously in the South Atlantic, the Indian, and a great part of the Pacific Ocean.

two parallels of latitude on the terrestrial globe, passing through the most northerly and southerly points on the earth's surface at which the sun is vertical. On the Armillary Sphere (q.v.), consequently, the ecliptic (the representation of the sun's path) touches but does not cross the tropics. The tropics include between them all those points on the earth's surface at which the sun is ever vertical. The tropic north of the equator is called the Tropic of Cancer, because the sun at the summer solstice (at which time he is vertically over that tropic) enters the constellation of Cancer; and the southern one is, for a similar reason, denominated the Tropic of Capricorn. Though usually said to be in 23½° N. and S. lat., the tropics are not absolutely fixed at a uniform distance from the equator, but the limits of their variation are extremely narrow (see ECLIPTIC). For 1st January 1882 the *Nautical Almanac* gave their position in 23° 27′ 16″·60 N. and S. respectively; and for 1st January 1892, 23° 27′ 11″·84 N. and S. The term subtropical is used somewhat loosely for a climate between tropical and temperate, and for the regions bordering on the tropics.

Troppau, the capital of Austrian Silesia, on the Oppa, a tributary of the Oder, 184 miles by rail NE. of Vienna. It has an old town-hall, a library of 35,000 volumes, and manufactures of cloth, beet-root sugar, &c. Pop. 20,562.

Trossachs, a wooded defile of Perthshire, 8 miles W. by S. of Callander, which Scott's *Lady of the Lake* has made one of the places of pilgrimage of the world. It extends 1 mile eastward between Lochs Katrine and Achray, and to the north has Ben A'an (1851 feet), to the south-west Benvenue (2393 feet).

Trotting. For more than half a century the trotting horse in America has been a distinctive type. Since this was recognised to be so the trotting strains have been much improved by careful breeding, while skilful training has greatly aided in the development of these useful horses. Indeed, it may be said that the trotter is the national horse of America, where it is considered the ideal animal for both business and pleasure. There are trotting strains elsewhere than in America—for instance, the Norfolk trotters in England and the Orloff trotters in Russia—but no other strain has attained the speed of the trotting-horse in America. The turf test of speed is the only one by which trotting strains can be judged, and trotting races are held in America for the purpose of applying this test, quite as much as to furnish sport to spectators. Compared with running races, even in America, trotting contests are not very popular. The trot and the amble or pace are kindred gaits, the latter being the faster. The trot is a diagonal and the pace a lateral gait. In the trot the order of movement is left fore-foot, right hind-foot, right fore-foot, left hind-foot. Thus the left fore-foot and right hind-foot move in unison, striking the ground together; then in turn the right fore and left hind foot complete the movement. In the pace two feet are also moved simultaneously, but the two feet moved at once are on the same side. From the same strains of blood there frequently come both natural trotters and pacers. Though pacing is the faster gait, it is not considered desirable, and pacers are often converted into trotters by the use of heavy toe weights on the forward feet. A competent trainer by the use of these weights can change an inveterate pacer into a trotter. As the horse becomes used to the trot the weights are gradually reduced. The gait of even natural trotters is oftener than not helped by the use of toe weights.

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The best strains of American trotters trace back to the thoroughbred gray stallion Messenger, imported from England in 1788 when he was eight years old. He was by Mambrino, first dam by Turk, second dam by Regulus, third dam by Starling, fourth dam by Fox, fifth dam by Bay Bolton, sixth dam by Duke of Newcastle's Turk, seventh dam by Byerly Turk, eighth dam by Taffolet Barb, and ninth dam by Place's White Turk. Though this record shows that Messenger's pedigree goes back to the very beginning of the thoroughbreds, it is generally thought that he himself was not, strictly speaking, a thoroughbred. The more frequent the Messenger cross is found in the pedigree of a trotter, the more valuable the strain is thought to be. Messenger begot Mambrino, Mambrino begot Abdallah, and Abdallah begot Rysdyk's Hambletonian. Rysdyk's Hambletonian, foaled in 1849, was out of the Charles Kent mare by Bellfounder, a horse imported from England, and said to come of the strain of Norfolk trotters, and with two crosses on the dam's side tracing back to Messenger. Rysdyk's Hambletonian is considered by breeders to be the father of the American trotters. Many experiments have been tried in breeding trotters for greater speed and endurance. Within the space of this article the various theories of breeding cannot even be stated, but recent performers, such as Maud S., Palo Alto, and Sunol, would seem to show that the Hambletonian blood on the side of the sire, with a rich infusion of thoroughbred blood on the side of the dam, is likely to produce faster trotters than any other crosses so far attempted.

The breeding of trotters has become in the United States and Canada a great industry. Yearlings from the trotting stock farms do not command as high prices as yearling thoroughbreds, but in maturity they appear to be more valuable. In 1886 two great breeding stables were sold—the Rancocas, in New Jersey, for breeding thoroughbreds, and the Glenview, in Kentucky, for breeding trotters. The Rancocas stallions sold at an average of $6370 each, and the brood-mares at $1422, or a general average of $1721. The Glenview stallions brought an average of $12,780, and the brood-mares $1678, and a general average of $2238. These were both breeding establishments of the first class. It is probable that a like comparative average would be maintained at lesser sales. Individual trotters have been sold for very high figures—many of the fastest of them to Mr Robert Bonner of New York. Although, through his not making public the prices paid by him, these cannot be stated with certainty, it is believed that he paid $35,000 for Dexter, $40,000 for Maud S., and $50,000 for Sunol. The young stallion Axtell was sold in 1889 for $105,000, and Nancy Hanks in 1891 for $75,000. These were all phenomenal trotters. Prices vary from these fancy figures down to $250.

The first trotting race in America of which there is a record was at Harlem, N. Y., in 1806, when Yankee did a mile in 2 minutes 50 seconds. Then there is a record of a match in Philadelphia in 1810, when a Boston horse trotted a mile in 2 minutes 48½ seconds. The next race was in 1818, when the time was 3 minutes. There was nothing very wonderful about these performances, for horses in England had before then done as well, if not better. In England, in 1800, Phenomenon trotted 17 miles in 56 minutes, and in the same month repeated the distance in 53 minutes. This was at the rate of 62 minutes 20 seconds for 20 miles. This English performance remained unbeaten until Messenger's great-grandson Trustee went the distance in 59 minutes 35½ seconds. Since then only six horses have equalled Trustee's performance. These long distant trials are justly regarded as cruel and unprofitable. The reduction of the trotting record has been steady but not rapid. Here are some of the prominent records:

1844	Lady Suffolk.....	trotted a mile in	2	min.	28	sec.
1859	Flora Temple.....	" "	2	"	19¾	"
1867	Dexter.....	" "	2	"	19	"
1871	Goldsmith Maid..	" "	2	"	17	"
1874	" " ..	" "	2	"	14	"
1878	Rarus.....	" "	2	"	13¼	"
1880	St Julien.....	" "	2	"	11¼	"
1881	Maud S.....	" "	2	"	10¼	"
1884	Jay Eye See.....	" "	2	"	10	"
1884	Maud S.....	" "	2	"	9¾	"
1885	"	" "	2	"	8¾	"
1891	Sunol.....	" "	2	"	8¼	"
1892	Nancy Hanks	" "	2	"	5¼	"

Among the pacers the best records are those of Johnston, which in 1884 paced a mile in 2 minutes 6¼ seconds, and Direct, which in 1891 did the same distance in 2 minutes 6 seconds.

Troubadours. See PROVENÇAL.

Troupial (*Icterus icterus*), a bird of the family Icteridæ, Hang-nests (q.v.), famed for its exquisite song, which is considered to be even finer than the mellow whistle of the Baltimore oriole.

Trout, the popular name of many species of the genus Salmo, as characterised by Cuvier, some of which are referred by Valenciennes to his restricted genus Salmo, some to Fario, and some to Salar (see SALMON, BULL TROUT). The name is given to some of the silvery species migrating to the sea, which are noticed in the article SALMON, as well as to all the yellow species, which constantly inhabit fresh waters. The latter are found in almost all the lakes and rivers of the temperate and colder parts of the northern hemisphere. The Common Trout (*Salmo fario* or *Salar ausonii*) is widely diffused in the eastern hemisphere, abounding in almost all the lakes and rivers of the British Islands and the north of Europe. It is found in very small streams, ascending even to their mountain sources, but attains its largest size where there is considerable depth of water and abundance of food. A trout caught in a branch of the Avon at Salisbury weighed 25 lb., and one was caught in Loch Stenness in Orkney in 1888 which weighed 29 lb.; but such a size is very rare, and even in ponds where the trout are regularly fed they seldom exceed 10 lb. A trout of 1 lb. or 1½ lb. is reckoned by the angler a very fine fish, and many a stream swarming with trout produces none nearly so weighty. The head of the common trout is large; the eye large; the general form symmetrical, stouter than that of the salmon,

Fig. 1.—Common River Trout (*Salmo fario*).

the convexity of the outline of the back nearly similar to that of the belly; the tail is slightly forked, except in old fish, in which it becomes almost square, and sometimes even slightly convex. The teeth are numerous, strong, and curved, two rows of them extending along the whole length of the *vomer*, with no marked group at its front. The colour is more or less yellow, but the tint varies much in the trout of different waters, sometimes passing into greenish black or violet. The colour is brightest in the trout of clear streams,

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On the back and upper part of the sides there are numerous spots of black and red; the belly is silvery white or yellow; the spots on the sides vary much. The fins are light brown; the dorsal fin and tail with numerous darker brown spots. The varieties which the common trout exhibits in tints and spots has led to attempts to distinguish several species; but these have not proved satisfactory to most naturalists. It is certain that the appearance of the trout is much affected by the character of the water in which it lives, and the food with which it is supplied. The trout of a river with a muddy bottom are very different from those of a clear gravelly stream, and those of a stream darkly coloured by moss are easily distinguished. The tint of the flesh varies as well as the external colours, being pink in some—the finest for the table—and white in others. Trout transferred from one locality to another soon change their tints, as they have a wonderful power of assimilating their colour to that of the medium in which they dwell.

The trout is very voracious, and readily devours almost any kind of animal food. Worms and slugs washed into rivers by rains are very acceptable to it. Small crustaceans are supposed to be the chief food of trout in some lakes and streams which are noted for the excellence of their produce. Small fresh-water shellfish, such as the fresh-water shrimp, are also a favourite food of trout; and the most beautiful trout in Scotland—those found in Loch Mulach Corry near Inchnadamph in Sutherlandshire—feed almost entirely on the fresh-water shrimp. Small fish of any kind which they can capture are their prey, and multitudes of salmon-fry thus perish. A gentleman well known to the writer of this article caught a large trout which had a very young viper in its mouth, bitten into three pieces. The leaping of trout for flies in a summer day or evening adds to the charm of many a rural scene. Small trout often throw themselves quite out of the water; the larger ones in general merely rise to take struggling flies from its surface. The angler adapts his lures to the season and the weather. In spring and summer, when the weather is fine, the artificial fly is very successful; bait, generally the worm, is used in wet weather, or when the streams are swollen by rains. The minnow is a good bait for large trout. No bait is more deadly than salmon roe, but the use of it is prohibited by law in Britain, for the sake of the salmon-fisheries (see ANGLING).

The trout generally spawns in the end of October and in November, when the lower jaw of the male becomes elongated, but not so much as in the salmon. The spawn is deposited in the same manner as that of the salmon, in gravelly beds, in running streams; and the lake-trout ascend streams for this purpose. Where trout have no access to proper spawning-ground recourse must be had to artificial means to increase the stock (see PISCICULTURE); but in some small streams their numbers seem incapable of being diminished by any amount of fair angling. The best feeding-grounds are often where there is no good spawning-ground within reach of the fish. The trout grows rapidly when it has abundant food. From instances of individuals kept in wells and ponds it is known to attain an age of thirty or even fifty years. Among the varieties of the common trout one called the Gillaroo Trout is found in Lough Neagh and other lakes of the north of Ireland. It attains a large size, is very thick in proportion to its length, and has much smaller teeth than the ordinary trout.

The Lochleven Trout (*Salmo levenensis* or *S. cæcifer*) is found in Lochleven in Scotland, where the common trout is also found, and is distinguished from it by the more pointed pectoral fins; the much longer rays of the tail-fin, which is also more pointed at its extremities; and particularly by the number of cæcal appendages, which are from forty-nine to eighty in the Lochleven trout,

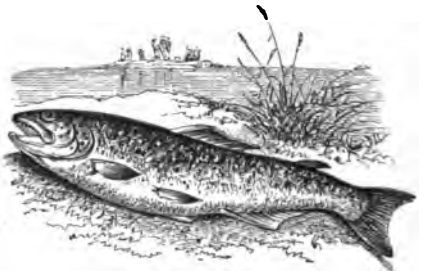

Fig. 2.—Lochleven Trout (*Salmo levenensis*).

whilst they do not exceed fifty in the common trout. The flesh of the Lochleven trout, which attains a large size, is a rich pink colour. Lochleven (q.v.), for its size, is probably the most productive trout-loch in the world. In 1888, the best year on record, 23,516 trout, weighing 21,073¾ lb., were captured by the rod; and in 1891 16,058, weighing 12,830 lb., were taken. There is an artificial hatchery in connection with Lochleven; and in 1891 nearly 300,000 healthy fry were deposited in spring in the feeders of the loch. With the exception of the lake species, all British trout are more or less migratory.

The Great Lake Trout (*Salmo ferox*) is the only other British species. It is found in some of the larger British and Irish lakes, and in the lakes of Scandinavia, seldom, if ever, ascending rivers, except for a short distance at the spawning season. It occasionally, but very rarely, attains a size of 30 lb., is a very powerful, active fish, and tries the skill of the angler in no small degree. It differs from the common trout in the longer muzzle, in the position of the fins, in having the tail square in all stages of growth, and in other characters. Its colour is generally deep purplish brown, passing into greenish or grayish yellow on the belly. The spots are large, and not numerous. The great lake trout feeds much on

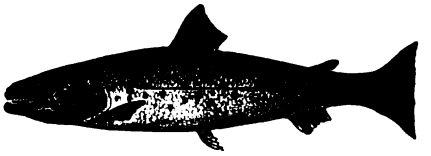

Fig. 3.—Great Lake Trout (*Salmo ferox*).

small fishes, and is as greedy as a pike. It is taken by night-lines, or by trolling with strong tackle and a small trout or other small fish (or artificial minnow) for bait. Young fish are taken with the artificial fly. The flesh of this species is inferior in quality to that of the common trout. Very different from it is the Lake Trout of the Lake of Geneva (*Salmo* or *Fario lemanus*), which is a fish of excellent quality, and nearly allied to the Salmon-trout (see SALMON). It ascends the rivers which fall into the lake, as the salmon-trout ascends rivers from the sea.

It should be stated that many persons, whose views are entitled to consideration, are of opinion that there is no specific difference between the *Salmo ferox* and the *Salmo fario*, and that the former is simply an overgrown specimen of the latter. The Loch Stenness trout of 29 lb. already mentioned tends rather to strengthen this opinion.

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North America has numerous species of trout. One of them, the Common Brook Trout, or Speckled Trout (*Salmo fontinalis*), differs considerably from the common trout of Britain; in fact, strictly speaking, it is a char and not a trout. It abounds in the streams of eastern Canada, and in the northern and middle parts of the United States. In September 1867 Mr George S. Page caught at the outlet of Rangeley Lake, Franklin County, Maine, two male trout, one weighing 10 lb., the other 9½ lb.; and in June 1871 Mr T. L. Page caught a Fontinalis in Mooseluc Maguntic Lake in the same county weighing 9¼ lb. The North American Lake Trout (*Salmo confinis*) inhabits the deepest waters of the great lakes, and sometimes attains a weight of 60 lb. It is dark-coloured, mottled with grayish spots. Its flesh is dirty yellow, and of very poor quality. It never takes the fly, but may be caught with the minnow, or a bait of fat pork. It is more sluggish than its congeners, and affords poor sport to the angler. There are several species of lake trout in North America. The finest in quality, as well as largest in size, is the Mackinaw Trout or Namaycush (*Salmo amethystus* or *namaycush*). It is not found in Lake Erie, nor in Lake Ontario, but in Lake Huron, Lake Superior, and the more northern lakes, even in those of the arctic regions. It inhabits the deepest parts of them, except in autumn, when it resorts to shallow water for spawning. The Siskiwit Trout (*Salmo* or *Salar siscowet*) of Lake Superior is of large size, stout, thick, and of rich flavour, but so fat as to be almost unfit for food. The Red-bellied Trout (*Salmo* or *Fario erythrogaster*) of the lakes of New York and Pennsylvania, sometimes 2½ feet in length, is deep greenish on the back, lighter on the sides, which are spotted with red, the belly orange-red. The north-west of America has its own peculiar species of trout, one of which, the Oregon Trout (*Salmo oregonensis*), is found in almost every stream from the snowy peaks of the Rocky Mountains to the sea, and is very similar to the common trout of Europe. British trout have been acclimatised in Tasmania.

In England there is a close time for trout and char, so that no trout or char of any kind can be sold in England or Wales under a penalty between the 2d of October and the 1st February. The penalties for the capture of any trout or char during close time are not exceeding £2 for the first offence, not less than £1, nor more than £2, for the second, not less than £2 for the third, and on each conviction forfeiture of all trout and char caught. In Ireland the close season for trout-fishing extends from 29th September to the end of February. Scotland has no close time for trout or char, and no gauge to prevent the taking of immature and undersized fish. There certainly should be a close time or a gauge, or both. The best period for a close time would probably be from 15th October to 1st March. Illegal methods of taking trout are discussed at POACHING.

See works cited at ANGLING; also Livingstone Stone, *Domesticated Trout* (Charleston, 3d ed. 1877).

Trouvère, the name given in northern France to the same kind of courtly or polished poet who in southern France, &c. was called Troubadour (see etymology at PROVENÇAL). Like the latter, he was usually attended by a jongleur, whose business it was to furnish an instrumental accompaniment to the songs which his master composed and sung. But the distinction was far from absolute, for many *trouvères* performed their own works, and many *jongleurs* made and mended verses. See CHANSONS DE GESTES, JONGLEURS, FRANCE (LITERATURE), ROLAND.

Trouville, a popular French watering-place, in the dept. of Calvados, at the mouth of the Tougues, about 10 miles SW. of Honfleur. It was always famous for oysters, but on its fine sands and its nearness to Paris depends its modern importance. It was first brought to notice by Alexandre Dumas. Pop. (1886) 5749.

Trover, in the law of England, is an action brought to recover goods from a person to whom they do not belong, but who has in some way obtained possession of them. It was founded on the old fiction that the rightful owner had accidentally lost the goods, and the party in possession had found them, and would not give them up to such owner. It is practically an action to try the title to the goods, and therefore is of extensive application in the law of contracts, as well as other branches of law. The plaintiff, if successful, recovers the value of the goods as a satisfaction. The defendant is said to have illegally converted or appropriated the goods; it is by the conversion of the goods that the damage is done, and for this the remedy is given. See Bullen and Leake, *Precedents of Pleadings*.

Trowbridge, a market-town of Wiltshire, on a rocky hill above the small river Biss, 12½ miles by rail SE. of Bath and 12 SSW. of Chippenham. A Norman castle at Court Hill has vanished. The fine Perpendicular church of St James (1475) has a spire 159 feet high; Crabbe the poet was rector from 1814 to 1832, and is buried in the chancel. A new town-hall, presented by Mr W. R. Brown, was opened by the Duchess of Albany in 1889; and there are also a market-house, public gardens, (1884), cottage hospital (1886), water-works (1873), &c. Trowbridge has been a seat of the woollen manufacture since Henry VIII.'s reign; and superfine broadcloth and kerseymere are largely manufactured. Pop. (1851) 10,157; (1891) 11,717.

Troy. 'The tale of Troy divine,' which forms the background of the *Iliad* of Homer, briefly told is that Paris (Alexander), son of Priam, king of Troy, carried off Helen, wife of Menelaus, king of Sparta; that the Achæan princes, under the command of Menelaus' brother, Agamemnon, king of Mycenæ, undertook to recover Helen; that the Achæans, having besieged Troy for nine years, eventually sacked the city and recovered Helen. These events were regarded as historical not only by the Greeks themselves, but by the moderns within the last half century, and a date (1184 B.C.) was assigned with as much precision and confidence to the fall of Troy as to the fall of man. But the remarkable revolution in the views of scholars about mythology, which was begun by Lobeck (see Vol. VII. p. 371) in 1829, and by the brothers Grimm (q.v.), changed all that. Many of the incidents in the Trojan war were shown to be myths common to most Indo-European nations at least. The story of the *Iliad* reduced itself to 'the old fight between the night and the morning, the old story of the victory and death of the solar hero around the walls and battlements of the sky.' And as late as 1875 it was finally said that 'to seek for fragments of history in either of these is like looking for gold in the rays of the sun' (Sayce, *Principles of Comparative Philology*, p. 311, note). The Troy and Mycenæ of Homer were regarded as the airy fabric of a poet's dream, when Dr Schliemann, who had begun his excavations in 1870, brought to light the actual stone walls and battlements of Troy, and then proceeded to Mycenæ, where 'he dug up such masses of gold as even he, the millionaire, had perhaps never before seen upon one spot.' Nor did he stop here: guided by his simple faith that what Homer said was true, he continued his excavations until he had demonstrated, by 'the

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science of the spade,' 'the former power and splendour of every city which is mentioned in Homer as conspicuous for its wealth and sovereignty.' It was natural enough that in the first joy of discovery he should straightway call the palace he revealed at Troy 'Priam's Palace,' the entrance to the citadel 'the Scæan Gate,' and the golden relics 'Priam's Treasure.' It was also natural that doubt should be cast on these identifications (subsequently withdrawn by Schliemann himself). In order, however, to understand the reasons for this doubt, we must state briefly what it is that Schliemann has done.

To begin with, the very site of Troy had been matter of dispute for 2000 years: tradition pointed unswervingly to the mound of Hissarlik, the learned unanimously (with the exception of Grote, who was in the right) declared that Hissarlik could not be the site. Schliemann excavated Hissarlik, and came first upon the remains of the Græco-Roman town, Novum Ilion; below it he dug out the ruins of four (or three) village settlements, one below another; below them he came upon 'the burnt city,' and finally upon the lowest, the oldest, the first city. The Græco-Roman city and the four (or three) village settlements have little interest for us; but the first city and 'the burnt city' are of the highest interest. The first and oldest city yielded in the way of relics principally pottery and stone implements. Metals were practically unknown to its inhabitants, who were plainly a settled pastoral and agricultural people, familiar with the art of weaving (as shown by the numerous spinning whorls discovered), and just beginning to use the potter's wheel. In fine, their culture shows a slight advance upon, but is fundamentally identical with, the culture ascribed by comparative philology to the pro-ethnic Indo-Europeans, who also were in the stone age, a pastoral and agricultural, but not a settled people, practised weaving and made pottery, but without the aid of the potter's wheel. The only other point to be noticed about the first city is that it must have been inhabited for a long time, because the circuit of walls first erected eventually proved too small to contain the inhabitants, and an enlarged ring of fortifications had to be built subsequently. The interval that elapsed between the desertion and decay of this first city and the foundation of the next must have been long, for a layer of earth 1 foot 9 inches deep intervenes between the debris of the first and the second or 'burnt city.' This city too enjoyed a long period of prosperity, for it also outgrew its original walls, which to begin with enclosed a larger area than that of the first city. The inhabitants of this city were, however, still in the stone age; but the number of gold and silver relics, and the presence of some copper implements, point to the approach of the bronze age, and seem to indicate a transition from the age of stone to that of metals. The potter's wheel was now regularly used; and heaps of oyster-shells prove that the inhabitants of the second city had attained a familiarity with the sea not possessed by the pro-ethnic Indo-Europeans. The two most important facts, however, in connection with this city are the discovery of 'Priam's Treasure' and the evidence that the city was destroyed in a conflagration. The treasure consists of big diadems of gold, chains and pendants of gold, golden ear-rings, all packed in a silver jar, bars of silver, 8700 small gold rings, discs, buttons, and small bars of gold, silver vases, gold cups, electrum cups, silver daggers, &c. The whole of this treasure had been packed together and stowed away probably in a secret chamber constructed in the acropolis wall.

We are now in a position to understand the first attitude assumed by criticism towards Schliemann's discoveries. It was admitted—it was impossible to deny—that Schliemann had proved that a wealthy and powerful city had existed in prehistoric times on the site which tradition asserted to be that of Homer's Troy, and that this city had been destroyed by fire; further, that he had proved that Mycenæ, which Homer makes the seat of the mighty Agamemnon, had been in prehistoric times a yet more wealthy and powerful city than Troy. But not only was there no evidence to show that Troy perished by *hostile* fire, there was actually conclusive proof that no expedition from Schliemann's Mycenæ could have destroyed his 'burnt city,' for, whilst Troy was in the stone age, Mycenæ was in the bronze age—i.e. belonged to a period which did not begin until long after the destruction of the 'burnt city.' Further, Homer could not possibly have known Mycenæ with personal knowledge, for he is familiar with the use of iron—i.e. the Homeric poems originated in the iron age, which did not begin until after the destruction of Mycenæ. Again, it was pointed out that the houses, the dress, the weapons, the mode of burial, and the religious beliefs of the Mycenæans were altogether different from those of the Achæans as described in Homer. The tradition, in fine, that Mycenæ and Troy had once been great and powerful cities may have been known to Homer, but he had no further knowledge than the tradition; and he simply ascribed (wrongly as it seemed) the culture of his own times to the age in which he (or the legend he received) laid the mythical and impossible expedition of the Mycenæans against Troy. This, the first attitude of criticism, still maintained by some critics, has been considerably modified of late by others. Objects have been discovered in 'the burnt city' of Troy decorated with the spiral and circular designs distinctive of Mycenæan wares; and this, it is argued, shows that the golden age of Troy just overlapped the Mycenæan period, and makes it possible, and even probable, that this contact between the two cities led to collision and to the destruction of Troy. Again, articles of iron have been discovered at Mycenæ, showing that Mycenæan civilisation continued into the beginning of the iron age. Further, though it is admitted that the earlier stage of Mycenæan culture (as presented in the shaft-graves) was absolutely unknown to Homer, it is now argued that the remains of the later period (as revealed in the bee-hive or domed tombs) may be reconciled with the older portions of the Homeric poems. But the discussion of these questions has hardly yet fairly begun. The importance of the discussion, however, is enormous: if it can be shown that the later period of Mycenæan culture is portrayed in any portion of Homer, the 'Homeric question' will be settled in favour of the disruptionists, for it is beyond doubt that they received their present form in the age of iron. Further, if the *Iliad* was sketched in firm outline in Mycenæan times, and was expanded and redacted afterwards, the transition from the one age to the other must have been gradual, and we shall have to look to Mycenæan culture for the origin of many things in Greek civilisation—whereas at present there seems to be an impassable chasm between the two civilisations.

Finally, we must state what additions Schliemann's discoveries have made to our knowledge of prehistoric Greece. Except for them our knowledge of Greece before 1000 B.C., the approximate date of the Dorian invasion (for which see Vol. V. p. 385), is a blank. In consequence of them we know that for some centuries before that date a homogeneous culture (of the bronze age) existed on the shores of most, if not all, of the lands and islands washed by the Ægean Sea. This culture may be called either Mycenæan, because

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the remains discovered at Mycenæ show it in its most glorious form, or Ægean, because of its *locale*. During this Mycenæan or Ægean period a lively intercourse was carried on between the land and the isles of Greece, and commerce was frequent even with Egypt. The latter fact is established on the one hand by the Egyptian wares discovered at Mycenæ by Schliemann, and on the other hand by the Mycenæan vases discovered in Egypt by Dr Flinders Petrie. These objects, further, give us the date of the Mycenæan or Ægean period: the Egyptian scarabæi discovered amongst Mycenæan objects bear the names of Egyptian kings back to 1500 B.C., while the Mycenæan vases found in the tombs of the Fayyum can be definitely dated 1400 to 1100 B.C. Finally, the carrying-trade of this period, by whomsoever done, was not done by the Phœnicians: the suggestion made on p. 386 of Vol. V., that the Phœnicians did not establish their commercial supremacy until after the time of the Dorian invasion, has since been confirmed by the evidence of the pottery discovered in the Necropoleis of Cyprus. It was the Phœnicians who introduced iron into Europe, and the European iron age dates from and after the time of the Dorian invasion. So much for what we know of the Mycenæan or Ægean period. We do not know what was the centre from which this culture originated and spread. We do not know whence came the inhabitants of Mycenæ—whether they were natives or immigrants from the sea. We do not know their name, their race, or even what family of nations they belong to: some call them Semites, some Indo-Europeans, some more vaguely Asiatics, some Carians, some Greeks. The truth is that as yet there is not evidence enough in favour of any one of these guesses to make it even plausible. How or why these peoples allowed their carrying-trade to pass into the hands of the Phœnicians we know not; and even if we may regard it as now generally assumed that the Mycenæan period was brought to an end, as far as the Peloponnesus is concerned, by the Dorian invasion, it is still matter of discussion, as we have seen, whether the overthrow was complete or whether some of the culture of the Ægean period was transmitted to later times, and became an element in what we know as Greek civilisation. Before this question and others raised by Dr Schliemann's discoveries can be settled a long period of inquiry, examination, and further discovery must elapse. At the present time it seems just within the bounds of possibility that there may be a historic basis for the siege of Troy; it seems certain that no portion of the Homeric poems can be contemporary with 'the burnt city;' possible, but not probable, that the 'original Homer' was a contemporary of the later period of Mycenæan culture; improbable that the Dorians, who were notoriously uncultured, should have been the channel through which any elements of Mycenæan civilisation were conveyed to historic Greece; and highly improbable that important affinities will be discovered between Mycenæan or Ægean culture and that Greek civilisation to which (religion apart) modern civilisation owes whatever is good and beautiful and true in it.

To Schliemann's own books—*Trojan Antiquities*, *Ilios*, *Troja*, *Mycenæ*, *Tiryns*, *Orchomenos*—the best introduction is *Schliemann's Excavations*, by Schuchhardt (Eng. trans. 1891). The first attitude of criticism is seen most clearly in Baumeister's *Denkmäler* (articles 'Mycenæ,' 'Troja'), and most authoritatively in Köhler's *Kuppelgrab von Menidi*. The later attitude is seen in Schuchhardt and in Leaf's introduction to the Eng. trans. of Schuchhardt. Petrie's article in the *Journal of Hellenic Studies*, xi. 271-277, is important, but has been seriously called in question by Cecil Torr in the *Academy* of June to August 1892. See also Dümmler, *Athen. Mitt.* xi. (1886) 15 ff., 210 ff.; Köhler, *ib.* vii. 250, iii. 1 ff.; Milchhöfer, *Anfänge d. Kunst*, 201. Captain Bötticher's view (exploded by the conference at Hissarlik, March 1892) that the remains discovered at Hissarlik were really a crematorium is best seen in his book *La Troie de Schliemann une Nécropole à Incinération*.

THE LEGEND OF TROY.—The legend of descent from the exiled Trojans, so long a favourite notion of the Romans themselves, early took firm hold of the popular imagination in France and England, but it was not Virgil and Statius so much as the spurious histories of Dares the Phrygian and Dictys of Crete (q.v.) that supplied the threads from which was spun the mediæval tale of Troy divine. As early as the 2d century Philostratus (q.v.) in his dialogue the *Heroica* began the artistic elaboration of the theme, and we find traces of it in the Arthurian legends, the Fabliaux, and the like; another Greek work is the *Iliaca*, in hexameters, by Joannes Tzetzes, the 12th-century Byzantine grammarian; two Latin elegiac poems of the 12th century are extant, the first anonymous, the other by Simon Chèvre d'Or, canon of the abbey of St Victor in Paris; but it was in 1160 that it took its final literary form in the *Roman de Troie* of Benoît de Sainte-More, a poem of almost 30,000 lines, dedicated to the English queen Eleanor of Poitiers. The characters and incidents are transformed by the artist's touch, taking the colour of his own time, while entire episodes are freely invented—of which the finest, devoted to the loves of the faithless Briseïda, daughter of Calchas, first with Troïlus, next with Diomede, furnished to Boccaccio the subject of his poem *Filostrato*, on the loves of Troilus and Griseida. Of the *Filostrato* Chaucer's 'litill tragedie' *Troilus and Cryseyde* was a free and largely expanded translation, although he speaks of himself as a translator out of Latin, and in two places quotes his author by the name of Lollius. Gower in his *Confessio Amantis* follows Chaucer, enumerating Troilus and Cressida among his illustrious lovers. Benoît's work was much imitated; it was translated into German in the 12th century, and into Latin at Messina in the 13th by Guido delle Colonne, who did not name his source, and long passed as the author. This work again had a wide popularity in Italian, French, and German translations. It was the origin of the *Troy Book* of Lydgate (1412–50; printed by Pynson, 1513); Caxton's *Recuyell of the Historyes of Troye* (*c.* 1474), the first book printed in English, was a translation of Raoul Le Fevre's French version. The *Life and Death of Hector* was a modernisation of Lydgate by Thomas Heywood (1614). From Henslowe's Diary we find that Dekker and Chettle in 1559 prepared a *Troilus and Cressida;* Shakespeare (1609) followed Chaucer for the story, and Lydgate for some of the details. The Troy legend kept its place throughout the middle ages in graver histories as well as in romances and mysteries, and it long continued to maintain a shadowy existence in chap-books. Brut, the eponymous Trojan hero who found his way to Britain, flourished in Geoffrey of Monmouth, Gaimar, Wace, Layamon, and long after these in English chronicles whether in verse or prose, and indeed in the 16th century Polydore Virgil was thought a fool and worse for doubting him.

See the introduction of Moland and D'Hericault to *Nouvelles Françaises en Prose du XIV^e Siècle* (1858); Joly, *Benoît de Ste-More et le Roman de Troie* (1870); W. Greif, *Die mittelalterlichen Bearbeitungen der Trojanersage* (Marb. 1886); Collilieux, *Dictys et Dares* (Gren. 1886); and the admirable introduction to E. Gorra, *Testi inediti di storia Trojana* (Turin, 1887). For the relation of Chaucer's to Boccaccio's poem, see W. M. Rossetti in Chaucer Society's publications for 1875.

Troy, capital of Rensselaer county, New York, on the east bank of the Hudson River, at the head

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of steamboat navigation, and 5 miles by rail above Albany, is built upon an alluvial plain 3 miles long and on the hills to the east (the southernmost known as Mount Ida). The most noticeable buildings are the marble court-house, the Troy Savings Bank building, including a fine music-hall, and several of the fifty churches. The city contains a high school, the Rensselaer polytechnic, and a Roman Catholic seminary. Cotton, hosiery, paper, stoves, car-wheels, bells, engines, machinery, axles, stoneware, mathematical instruments, &c. are manufactured, and there are foundries, breweries, distilleries, carriage-factories, flour-mills, and a number of shirt and collar factories employing 8000 girls. Steamers run daily in summer to New York. Two bridges cross the Hudson to West Troy (q.v.). Troy was settled by the Dutch in 1659, and incorporated in 1816. Pop. (1850) 28,785; (1880) 56,747; (1890) 60,956.

Troyes, a town of France, the capital formerly of the province of Champagne and now of the department of Aube, on the left bank of the river Seine, 104 miles ESE. of Paris by rail. In spite of modernisations it is still an old-fashioned place, with many quaint timbered houses. The principal buildings are the cathedral, a splendid specimen of Flamboyant Gothic, founded in 872, and rebuilt between the 13th and 16th centuries; the churches of St Urban, the Madeleine, St Pantaléon, and St Rémi, the Hôtel de Ville (1624–70), and a public library, containing 110,000 vols. and 5000 MSS. Troyes carries on cotton, linen, and woollen manufactures, and, as the centre of a rich agricultural region, has a large transit trade. Pop. (1872) 38,113; (1891) 49,808. The capital of the Celtic Tricassii, Troyes was called by the Romans *Augustobona*, later *Civitas Tricassium*, and then *Trecæ*, whence the modern name. Under the Counts of Champagne it rose in the 12th century to great importance, and so late as the close of the 16th century had upwards of 60,000 inhabitants. Here the treaty uniting the French and English crowns was concluded May 21, 1420, between Henry V. of England, Charles VI. of France, and the Burgundian party. It was sealed soon after by Henry's marriage with the princess Catharine. See Boutiot's *Histoire de Troyes* (5 vols. 1870–80).

Troy-weight seems to have taken its name from a weight used at the fair of *Troyes*, an important centre of commerce during the middle ages. Like Cologne, Toulouse, and other towns, Troyes may have had its own special system of weights. A Troy pound (of what value is unknown) is first mentioned in Britain in 1414, long before which period the standard pound of 12 oz. as well as another pound of 12 oz. (the Tower pound) was in use. The term 'Troy' was first applied to the standard pound in 1495, but at the same time no change seems to have been made in its value, and it continued, as before, to be exclusively employed by the dealers in the precious metals, gems, and drugs. See POUND. The troy pound contains 12 oz., each ounce 20 pennyweights, and each pennyweight 24 grains; thus the pound contains 5760 grains, and is to the avoird. pound as 144 to 175; while the troy ounce is to the avoird. ounce as 192 to 175. (The apothecaries' oz. and lb. are now practically obsolete; drugs are bought and sold by avoirdupois, though compounded by apothecaries' weight.) The old English pound, to which the term Troy was afterwards applied, was doubtless the pound of silver; and the Tower pound of 12 oz. differed from it only by $\frac{1}{4}$ths of an ounce.

Truce, a suspension of hostilities between two armies or states for a period specially agreed upon. During a truce it is dishonourable to occupy more advanced ground, or to resort to any act which would confer advantage. A truce requires ordinarily to be confirmed by the commander-in-chief to become binding. It is lawful to break it before the prescribed period on notice previously agreed on being given to the opposite party. This is called denouncing a truce. For the 'truce of God,' see GOD'S TRUCE.

Truck-system (English *truck*, Scotch *trock*, French *troquer*, 'to barter') is the practice of paying workmen in goods instead of money. Where large undertakings are carried on at a distance from towns, it is almost necessary that employers should take steps to provide for a regular supply of provisions and other necessaries, to be sold to their men. This form of trading is open to objection on many grounds. The profit to the employer is very doubtful, for the capital which he devotes to his shop might probably be used to greater advantage in his proper business; the men are liable to be defrauded in various ways, because they cannot bargain on equal terms with their employer. A colliery owner, for example, may set up a shop, and may refuse to employ any man who does not deal at the shop. He may supply goods of inferior quality, and dismiss any man who is bold enough to complain. He may make the advances frequently required by the improvident wage-earner, intimating at the same time that he expects the money to be spent at his shop and no other; the account may be further complicated by vexatious deductions of pay for sharpening tools, &c.; and the workman may submit to all these exactions, because there is the threat of dismissal in the background. The evils of the truck-system are known in many countries; Canadian lumbermen, Newfoundland fishermen, and German Socialist leaders have protested in recent years against the abuses above described (cf. also MEXICO, p. 168). In England the Truck Act of 1831 (extended by the amending act of 1887 to all persons engaged in manual labour, except domestic servants) was intended to provide a remedy. Wages are directed to be paid in current coin; the employer cannot plead payment in goods as an answer to an action for wages, nor can he maintain an action for the price of goods supplied. He may supply medicine, medical attendance, fuel and tools for mining, provender for beasts, house accommodation, and victuals prepared under his own roof. Deductions of pay are strictly regulated by the Act of 1887. These statutory rules are sometimes evaded; men who require advances of pay are too much at the mercy of employers to take advantage of the acts. The evils of the system are graphically described in Disraeli's *Sybil*. In 1853 Mr J. H. Burton was employed by the government to investigate the working of the system in Scotland. His report seems to indicate that legislation fails to reach the abuses complained of; attempts to suppress a long-standing practice may even strengthen its hold. Combination and improved habits of thrift among workmen put an end to the system by making them less dependent on their employers. Employers who evade the law usually allege that they cannot help themselves. The rate of wages, they say, is fixed on the assumption that part will come back in the shape of profit on goods; if they give up the shop, they must pay lower wages, and this the men will not stand. For the English law relating to this subject, see Macdonell, *Law of Master and Servant*. See also CROOK (GEORGE).

Truffle (*Tuber*), a genus of fungi of the order Tuberacei, division Ascomycetes; globose, or nearly so; of a fleshy substance, with a distinct skin, the whole substance pervaded by a network of serpentine veins, which are the *hymenium*, and bear the spore-cases in minute cavities. The species are not

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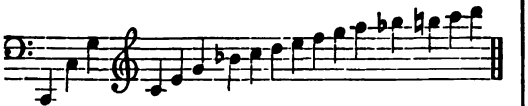
numerous; they are very generally diffused in temperate parts of the world; they are subterranean, often found at the depth of a foot or more in the soil, usually near the roots of trees, or rarely living on the surface. Some of them are amongst the most highly valued of esculent fungi. They are said to have a stimulating aphrodisiacal quality. The Common Truffle (*T. æstivum*) is of a black colour, and has a warty surface. It is the principal species sold in the English markets. It varies in size from that of a large plum to that of a large potato. On account of its agreeable flavour, it is used in the preparation of many dishes. It is common in the central and southern parts of Europe, chiefly in loose soils, in woods and pastures, as in the chestnut woods of France and Italy. In England it occurs pretty abundantly in the downs of Wiltshire, Hampshire, and Kent. Truffles probably occur in many districts, but owing to their subterranean growth are unsuspected. In England, and also on the Continent in localities in which they are known to grow, trained dogs are employed to discover their whereabouts, and in France and Italy pigs are employed for the same purpose. The best French Truffle, which is considered superior to the English, is *T. melanosporum*. The White Truffle of Germany, which also is found in England, is *Choiromyces albus*, a genus closely allied to Tuber, but less esteemed in cookery than the common truffle. The Red Truffle of the Bath market is *Melanogaster*, a genus of the allied order Hypogœi, and is not therefore a true truffle. The African truffles, species of Terfezia and Tirmannia, somewhat inferior to it in quality, are in some parts of Algeria and Tunis an important food-supply for the people. All attempts at cultivating the truffle in England have hitherto failed. In the south of France they have, it is said, been produced in woods which have been watered with water in which the parings of the truffle had been steeped. As yet, however, the manufacture of spawn, as in the case of the mushroom, has been attempted in vain. In Poitou the practice prevails of enclosing a space on the downs and sowing it with acorns. When the oaks are large enough to shade the ground, it is said there is sure to be a crop of truffles. Light chalk soil appears to be preferred by truffles, and they are found most usually in beech, oak, birch, chestnut, hazel, and hornbeam woods.

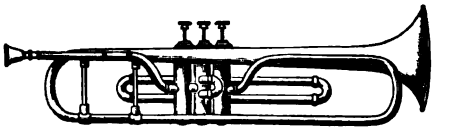
Truffle (*Tuber æstivum*).

Trujillo, (1) a town of Spain, the birthplace of Pizarro, is in Cáceres province, 60 miles NE. of Badajoz. It is built partly on a granite crag, and manufactures linen, leather, and pottery. Pop. (1887) 10,773.—(2) An episcopal city of Peru, capital of the dept. of Libertad, on a fertile plain near the seacoast. It was founded by Pizarro in 1535, has walls that were raised in 1686 to keep out the filibusters, and contains a college, a theological seminary, and high school. Its ports are Huanchaco and Salaverry. Pop. 7500.—(3) A port of Honduras, on the north coast, with 4000 inhabitants and an export trade of over $600,000 (bananas, hides, mahogany, rubber, and cattle). The town dates from 1524.

Trullan, the name (derived from the dome-roofed hall—Gr. *troullos*—of the palace in which the Fathers assembled) given to two church councils. The first Trullan Council (680) is the 6th œcumenical council, which condemned monophysitism. The second, called by Justinian in 692, established 102 canons for the discipline of the church, allowing the marriage of priests. This council, also called Quinisext, as being meant to supplement the 5th and 6th œcumenical councils, is not accepted by the Roman Church.

Trumbull, JONATHAN, an American patriot, was born at Lebanon, Connecticut, 12th October 1710, and graduated at Harvard in 1727. He was successively judge, deputy-governor, and governor (1769–83) of Connecticut, and took a very prominent part in forwarding the war of independence. Washington placed great reliance on him, and frequently consulted him: to this habit, and his phrase, often repeated when in doubt, 'Let us hear what Brother Jonathan says,' has been traced the name which stands (though not so generally now as 'Uncle Sam') for a personification of the United States as 'John Bull' does for England. Trumbull died 17th August 1785. There is a Life by J. W. Stuart (Hartford, 1857).—His son John (1756–1843) was eminent as a painter. His best works are several portraits of Washington and others, 'The Battle of Bunker Hill,' 'Death of Montgomery,' and four paintings in the capitol at Washington, representing the Declaration of Independence, the surrender of Burgoyne and of Cornwallis, and Washington's resignation. A gallery of his historical pictures, of considerable value for their portraits, &c., became the property of Yale College in return for an annuity of $1000.

Trumpet, the most ancient of wind-instruments, is formed of a long, narrow, straight tube, bent twice on itself, the last fifteen inches tapering into a bell, and sounded by means of a cupped mouthpiece (for figure of mouthpiece, see HORN). The simple form of the instrument has been used from 'time immemorial' as a military signalling instrument, being specially attached to the cavalry and artillery branches, while the Bugle (q.v.) served the infantry. From its power and brilliancy of tone it has also been a favourite instrument with many composers of orchestral music. From the length and contracted nature of its bore its open harmonic notes (see HARMONICS) in the upper register become nearly consecutive, the effective notes being

A slide arrangement, adapted from the trombone, invented some time during the 18th century and subsequently improved by the celebrated player



Valved Trumpet.

Harper, gives most of the chromatic scale. A simpler form with three valves, giving all the scale, though its tone is greatly deteriorated in consequence, is now generally used.

Its music is written in the key of C, and it is provided with a series of crooks to put it into the different keys required. These crooks lengthen the instrument from about 67 inches to 8 feet, and give it a range of the following keys: G, F, E, E♭, D, C. For trumpet sounds or calls, see BUGLE; for trumpeter, see BAND (MILITARY).

Trumpeter (*Psophia*), a genus of crane-like birds. Only half-a-dozen species are known. The

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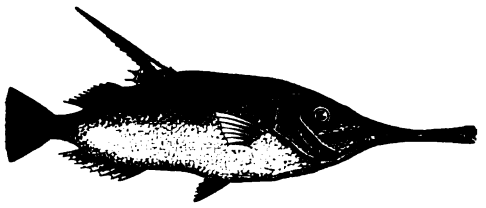
Trumpeter (*P. crepitans* — the *Agami* of the Indians) is described by Schomburgk as occurring in large flocks throughout British Guiana, chiefly in damp forests near the coast. They are very easily tamed, and their flesh is palatable. The name trumpeter refers to 'the loud and very curious ventriloquous sound which these birds produce with closed mouth.' The same name is also applied to the whistling swans (*Olor*).

Trumpet-fish, or SNIPE-FISH (*Centriscus*), a genus of fishes referred to the family Fistularidæ,



Trumpet-fish (*Centriscus scolopax*).

or to a special family Centriscidæ. The compressed and somewhat oblong body is covered with small spiny scales; the toothless mouth lies at the end of an elongated tubular snout; the second ray of the first dorsal fin is a strong toothed spine, and the ventral fins, which lie in a groove, are also serrated. The fish measures about 5 inches in length; its colours are rose or reddish green above, silvery beneath. It sometimes occurs on the south coast of Britain, and is common in the warmer European waters. It is sometimes called sea-snipe, and, as this suggests, is esteemed a delicacy, and is often to be seen in the markets of Italy. The name 'trumpeter' is also given to a well-flavoured New Zealand fish (*Latris hecateia*), not far removed in relationship from the Scorpænidæ.

Trumpet-flower, the popular name of various plants which produce large trumpet-shaped flowers. The genera Bignonia, Tecoma, both belonging to the natural order Bignoniaceæ, and Solandra, belonging to Solanaceæ, are examples of the plants commonly named trumpet-flowers.

Trunk-fish, a name for the Coffer-fish (q.v.).

Trunnion. See GUN.

Truro, a city of Cornwall, of which it is considered the metropolis, though Bodmin is the county town, stands 12 miles NNE. of Falmouth and 54 W. of Plymouth, at the junction of the Allen and the Kenwyn, here met by a tidal inlet, the Truro River, whose banks present beautiful scenery, and which admits vessels of 100 tons to the quays of the town. Truro is the centre of a mining district, and largely exports tin and copper ore. The ancient Cornish bishopric of Truro was revived in 1876; and the foundation-stone of its cathedral was laid by the Prince of Wales on 20th May 1880, the building being consecrated on 3d November 1887. A granite Early English structure, designed by Mr L. C. Pearson, R.A., it incorporates a portion of the old parish church of St Mary's (1518), and will, when completed, measure 300 feet by 109 across the transepts, with a central tower 250, and two western towers 200 feet high. Other buildings are the Italian town-hall and market-house (1847); the Tudor public rooms (1868), with the county and Bishop Phillpott's libraries; the grammar-school (1546); and the Royal Cornwall Infirmary (1779). Foote, Bone, Martyn, and the Landers were natives, and Dr Wolcot practised here. A very ancient municipal borough, Truro returned two members to parliament from 1239 till 1885. Pop. (1851) 10,733; (1891) 11,131.

Truro, a Nova Scotian manufacturing town of 5000 inhabitants, at the head of Cobequid Bay, and 62 miles NNE. of Halifax by rail.

Truss. See HERNIA.

Trust, an arrangement by which property is handed to or vested in a person, in the trust or confidence that he will use and dispose of it for the benefit of another. At Rome such an arrangement was called a *Fidei-commissum* (q.v), and at first the honour of the trustee was the only security for the performance of his duty; Augustus gave legal validity to trusts, and appointed a special prætor to enforce them. In England land was in early times frequently conveyed to persons in whom the owner had confidence, that they might hold it to the use of other persons indicated by him. The courts of law looked only to the legal title, and took no notice of the uses to which the land was held; but the Chancellor would compel a 'feoffee to uses' to do his duty. The use was turned into a legal estate by statute in 1536, but the equitable powers of the Chancery remained, and were freely used to enforce any trust, whether relating to land or to personal property. Trusts of land must be declared in writing, but this rule does not apply to trusts raised by implication or construction of law. Thus, if A purchases land with the money of B, he holds it as trustee for B, although there may be no written agreement between them. The person who holds property in trust is a *trustee;* the person for whose benefit he holds is called *cestui que trust* (he that has the benefit of the trust). In declaring a trust no particular words are necessary, but the intention of the party making it must be clear. Thus, in wills, a testator sometimes uses words which do not amount to an express trust, but speaks of his 'wish and desire,' or his 'confidence,' that the executor or trustee shall do certain things. These are called in the law precatory trusts; they are enforced if no uncertainty exists as to the purposes or mode of carrying out the trust. But if a testator merely recommends an executor to 'consider certain persons,' 'to be kind to them,' or 'to do justice to them,' or 'to make ample provision for them,' &c., such expressions are treated as too vague to be binding, and therefore the executor may disregard them, or use his own discretion. A trustee's is not a compulsory office, but gratuitous, and therefore he need not accept the office unless he pleases. But if he once accept he is not at liberty afterwards to renounce, unless the trust-deed contain a provision enabling him to do so, or the court for good reasons discharge him. A trustee cannot delegate the office to a third person, but continues personally bound to do his duty. Where there are several trustees appointed the office is considered joint, so that if one dies the survivors continue to exercise the office. As a general rule, all must join in doing any act; but if the trust is of a public nature a majority may bind the minority. Each trustee is liable only for his own acts or defaults, and this is so even though, for form's sake, he join his co-trustees in signing a receipt, if he can show that he never received the money in point of fact. Nevertheless when money lies in the hands of one trustee the others ought not to be satisfied with his mere statement that the money has been invested by him, but should see that it is actually done. Another rule is that a trustee is not allowed to make a gain of his office; and so jealous is an English court of this rule that trustees have sometimes been restrained by the court from shooting over the trust estate. A trustee is personally liable if he trade with the trust funds, or buy shares in a joint-stock bank; for, even though the trust-deed authorise this to be done, he will be liable to pay the debts of the

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trading concern, though far exceeding the amount of the trust funds. So, if a trustee is a solicitor, and does legal business for the estate, he will not be allowed to charge for his care and trouble, but at most will be allowed only the costs out of pocket. It is seldom, therefore, that a trustee can get any benefit to himself from the trust estate. Formerly if *cestui que trust* died without heirs land held in trust belonged to the trustee, but the rule has been altered by statute, and the escheat is now to the crown. It is the duty of a trustee to keep the trust funds safe; and if they consist of moneys, then he ought to invest them in government stock, and not let the money lie unproductive. He is not entitled to lend the money on personal security, or in the shares of any private company; but he may invest in mortgages, unless he is forbidden by the deed or will. If there is, therefore, no power to invest in mortgages, the trustee must invest in consols or in some other security authorised by the orders of the Supreme Court. The trustees, as a general rule, must pay interest whether they invest the funds or not (if they have had time to invest) to the *cestui que trust;* and they must account for all the profits they make with the trust funds, whether rightly or wrongfully. If a trustee has grossly misconducted himself as to the trust funds he will be charged 5 per cent. interest, and sometimes compound interest. A trustee is entitled to be indemnified for all the reasonable expenses or outlay attending the execution of the trust, but he must in general bear the loss of any mistake as to the law; but if there is any peculiar difficulty in carrying out the trust, he is entitled to take the opinion of, or even to throw the chief management upon, the Chancery Division of the High Court, as the only safe protection. When trustees are guilty of gross negligence, mismanagement, or misconduct the Court will remove them and appoint others. For a full statement of the law on this important subject, see Lewin on Trusts. In Scotland there are several technical points of difference from the above in the law of trusts. By Act of 1867 Scottish trustees were limited to investment in Scottish heritable security (considered in Scotland superior to government stock), government stocks, public funds, and Bank of England stock. The Act of 1884 extended the choice, adding securities the interest of which is guaranteed by parliament, debenture stock, and some kinds of preference or guaranteed stock of certain British railways, stock or annuities issued by British municipal corporations if properly secured, certain East Indian and colonial stocks, and feu-duties. In Scotland, as in England, trustees holding shares of a joint-stock bank as part of the trust funds are liable personally to pay the debts of the bank.

The term trust is of late applied, especially in America, to an arrangement for the control of several companies under one direction, to cheapen expenses, regulate production, and beat down competition; or nearly in the sense of Syndicate (q.v.).

Trygon. See STING RAY.

Trypsin is a ferment which occurs in the secretion of the pancreas. It may be isolated from the pancreatic juice in the same way that pepsin can be isolated from the gastric juice. It possesses the power of digesting nitrogenous bodies (like meat fibre and gelatine) in an alkaline solution, converting them into peptone. Extracts of pancreas containing trypsin are sometimes administered to those whose digestion is weak; but their most valuable application is for the pre-digestion of foods, as in the preparation of peptonised beef extract and peptonised milk. See DIGESTION.

Tsad, or CHAD, LAKE, a lake in the Soudan, northern Africa, with an estimated area of 10,000 sq. m. in the dry season, and four or five times that extent during the rainy months. The western half contains the real lake; the eastern is generally a complex of low islands, separated by shallow canals, and inhabited by a race of semi-amphibious Negroes. The few streams that reach the lake are all small, except the Shari, which comes from the south-east. Lake Tsad, whose waters are perfectly fresh, has no regular outlet. It sometimes overflows towards a great depressed plain 300 miles to the north-east. The first Europeans to see it were Denham, Clapperton, and Oudney; Nachtigal explored it in 1870. The French have of late done much exploration hereabouts, with a view of extending their influence; see the work on the travels of the unfortunate explorer Crampel by Alis, *À la Conquête du Tchad* (1892).

Tsaidam. See TIBET.

Tsarskoye Selo ('Imperial Town'), a town of Russia, 18 miles S. of St Petersburg by railway (the first made in Russia), is a royal residence and favourite resort of the imperial family. The façade of the great palace of Tsarskoye Selo is 780 feet long; the church is a miniature copy of St Sophia at Constantinople; and the parks and gardens cover 3 sq. m. Pop. 15,000.

Tschudi, an ancient and noble family in the Swiss canton of Glarus. AEGIDIUS or GILG (1505–72) was active on the Catholic side during the struggles of the Reformation of Switzerland. Of his numerous works the most important is the *Schweizerchronik*, which, continued from 1470 by Johannes von Müller, was long the standard authority on Swiss history. Though it is proved to contain baseless legends and fables (some of them apparently his own invention), the work has great interest and literary merit, and has accurately preserved the text of many ancient documents which would otherwise have been lost. There are works on him by Fuchs (1805), Blumer (1871–74), and Herzog (1888). To the same family belongs JOHANN JAKOB VON TSCHUDI, the eminent traveller and naturalist, born at Glarus, 25th July 1818. After completing his studies at Leyden and Paris, he undertook (1838) a voyage round the world; but circumstances restricted his design to an investigation into the natural history and ethnography of Peru, where he remained for five years. He settled in Austria, and from 1866 till 1883 was Swiss ambassador at Vienna. He died 8th October 1889. His writings comprise works on the batrachians, the *Fauna Peruana* (1844–47), on the Quichua language, on Peruvian antiquities, a Peruvian drama, and sketches of his travels in Peru and the rest of South America.

Tsetse (*tse-tse;* native African name of *Glossina morsitans*), a dipterous insect which is a terrible pest of some parts of South Africa. It is not much larger than the common house-fly, which it resembles in shape, and is of a brown colour, with four yellow bars across the abdomen. The wings in repose project considerably beyond the abdomen. It is remarkably alert, at least during the heat of the day, and dexterously avoids any attempt to catch it with the hand. Its bite is

Tsetse (*Glossina morsitans*): *a*, natural size.

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Yet the bite is harmless to man, who feels no more annoyance than from the bite of an ordinary gnat, to the mule, the ass, the goat, and apparently to antelopes and the other wild animals of the country. The proboscis is adapted for piercing the skin, is grooved, and has a horny bulb at the base; and the fly lives by sucking blood. At first no effect is perceived; but sometimes in a few days after an ox has been bitten by the tsetse, sometimes not for weeks or even months, the eyes and nose begin to run, 'the coat stares as if the animal were cold,' a swelling appears under the jaw, and sometimes at the navel, emaciation and flaccidity of the muscles ensue, purging, sometimes staggering and madness, and finally death. No cure for the bite is known; but smearing cattle before passing through the 'fly-belts' with a paste of manure and other unpleasantness seems to some extent to ward off the fly. Nothing about the creature is more curious than the sharply-defined areas or 'fly-belts' (sometimes quite small) in which the fly is found, adjoining districts being, for no ascertainable reason, absolutely free of it. The valley of the Limpopo is a special haunt; also the region between the Transvaal and the east coast. The *Zimb* of Abyssinia is either identical with the tsetse, or is a similarly venomous dipterous insect.

Tsóng-kha-pa. See LAMAISM.

Tuam, a town of County Galway, 130 miles NW. of Dublin by rail, on a branch of the Clare. Pop. 3567—mostly Catholics. It is the seat of a Roman Catholic archbishop and of an Anglican bishop. The (modern) Catholic cathedral is very large; the Anglican one, mostly rebuilt just prior to 1878, contains a chancel dating from 1150.

Tuareg, or TUARIK. See BERBERS, SAHARA.

Tuba, a name sometimes given to musical instruments of the Saxhorn (q.v.) species.

Tuber. This is one of the forms of subterranean stems, and is formed by a part of the stem becoming thick and fleshy. This tissue is of a simple parenchymatous nature (see TISSUE), well filled with starchy matter, which serves as a store of food material for the plant, and especially as a stock in trade for the young plants which often grow from the buds of the tuber to begin life upon. These buds, together with the minute scales in the axils of which they occur, show that tubers are not, as they are commonly thought to be, Roots (q.v.). The true roots arise from the tubers. The potato (*Solanum tuberosum*) is the most familiar example. The buds in this case are called 'eyes.' If they are cut off the tuber and set in the ground they grow into new plants. This is the method adopted by gardeners for the propagation of the potato plant. It has been observed that the ordinary aerial buds show a tendency, occasionally, to become tuberous. This is taken advantage of by gardeners, who, by surrounding the lower part of the stem with earth, cause the buried buds, which would normally grow into branches, to become tubers. The Jerusalem artichoke (*Helianthus tuberosus*) is another common tuber. The subterranean fructification of a group of fungi, the Tuberaceæ or Truffles (q.v.) are called tubers.

Tubercle is the characteristic product of a specific micro-organism, the *Bacillus tuberculosis*. It is a new formation, belonging to the group of Granulomata or granulative growths, which, in virtue of their recognised infectiveness, have been classed as Infective Granulomata. Tuberculosis (see CONSUMPTION, SCROFULA) is a specific infective disease, induced by the invasion of the *Bacillus tuberculosis*, and characterised by the Tuberculosis is *local* or *general*, according to the distribution of the infection.

Prior to 1882 it would have been impossible to define tubercle in those words. Tubercle is, nevertheless, a term of great antiquity. Its connotation has varied considerably, and this has been the source of much confusion. By older writers, and up till the beginning of the 19th century, tubercle was used to signify a *nodule*, or small indurated mass. Such indurated masses (scirrhosities) had been recognised in the lungs and elsewhere. But in the description of these, tubercle had a morphological rather than an etiological significance; its application was not restricted to the product of a particular pathological process. With the development of anatomical study in the 17th and 18th centuries, these 'tubercles' of the lung received much attention; but they were misunderstood and interpreted incorrectly. Some observers spoke of them as altered glands. Sydenham speaks indifferently of 'glandules' and 'tubercles' arising in the lungs. Cullen recognised in tubercles one of the most frequent causes of pulmonary phthisis, but he did not attempt further definition than 'small tumours which have the appearance of indurated glands.' In the 18th century the occurrence of widely disseminated and more or less uniformly distributed tubercle—miliary tubercle of later times—was recognised. The classic comparison between such tubercle and the millet seed had been established—a comparison which has survived to our times and is in use in the schools by some who have never identified the millet seed.

Early in the 19th century the anatomical conception of tubercle was merged in the etiological through the work of the French physicians Bayle and Laennec (see CONSUMPTION), who expounded the view that 'consumption was essentially due to the presence in the lung of little granular masses of varying size and character.' This was the first suggestion of tuberculosis as a synonym for consumption or phthisis. The tubercular degeneration Bayle (1810) held was 'a chronic, specific affection, quite independent of any glandular or lymphatic inflamnation.' This view was advocated strongly by Laennec (1834), who recognised four forms of tubercle—viz. (1) miliary, (2) crude, (3) granular, (4) encysted; and later by the French clinician, Louis. Their united teaching led to the earliest crystallisation of the doctrine of tuberculosis, and proved the basis of much after-work.

The weight of Virchow's powerful argument (*Die krankhaften Geschwülste*, 1865) was directed against the view of a common specific element in Laennec's four groups. He concluded rather that the 'crude,' or yellow tubercle, was a product of retrograde cellular metamorphosis, and he limited the term tubercle to the first of Laennec's varieties. He emphasised the appearance of caseation or necrosis of the tissue elements, which occurs in tubercular (and other) foci, and thought that if a sufficiently careful examination were made, a precedent condition of caseation would be discovered, in nearly every instance, in relation to the eruption of tubercle. From the clinical side this view received support from Niemeyer (1866), who held that the order of events in most cases of consumption was the occurrence of a 'catarrhal pneumonia,' which might resolve naturally, or might be followed by the process of caseation or cheesy degeneration. A 'caseous catarrhal pneumonia' was followed by breaking down of the lung tissues and the establishment of the condition of 'phthisis.' The eruption of tubercle proper was, according to Niemeyer, a secondary feature. Most cases of 'phthisis' were to be traced to the effects of 'neglected cold,' and Niemeyer believed that the

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assertion of Laennec and his followers, that such 'colds' had little influence, was fatal both to prophylaxis and treatment.

A new phase in the pathology of tubercle was inaugurated by the experimental researches of Villemin (1865), who, on introducing caseating material or the expectoration of phthisical patients subcutaneously into rabbits and other animals, found that they became tubercular—i.e. that tubercles were discoverable in many of their viscera in periods varying from three to six weeks. This result followed the introduction of such material only. This led Villemin to the conclusion that tuberculosis was a specific inoculable disease, to be ranked along with other known infective processes. He believed that infection might result from inoculation, contagion, or the absorption of germs suspended in the air. Those views, though questioned at first, were fully confirmed by subsequent observers, some of the keenest critics (Cohnheim, Sanderson, Wilson Fox) being converted by a repetition of their own experiments. The following conclusions which were put in writing in 1866, as the result of ten years' observation and reflection by Dr William Budd of Clifton, form a most important landmark in the history of this question. In the light of more recent knowledge, they testify in an eminent degree to the prescience of their author. They are—(1) 'that tubercle is a true zymotic disease of specific nature in the same sense as typhoid fever, scarlet fever, typhus, syphilis, &c.; (2) that, like these diseases, tubercle never originates spontaneously, but is perpetuated solely by the law of continuous succession; (3) that the tuberculous matter itself is (or includes) the specific morbific matter of the disease, and constitutes the material by which phthisis is propagated from one person to another and disseminated through society; (4) that the deposits of this matter are, therefore, of the nature of an eruption, and bear the same relation to the disease phthisis as the 'yellow matter' of typhoid fever, for instance, bears to typhoid fever; (5) that, by the destruction of this matter on its issue from the body, by means of proper chemicals or otherwise—seconded by good sanitary conditions—there is reason to hope that we may eventually, and possibly at no very distant time, rid ourselves entirely of this fatal scourge.'

During the next fifteen years opinion gradually inclined more widely to the specific doctrine of tuberculosis. In 1880 Cohnheim declared that 'neither the nodular form, the histological structure, the occurrence of giant-cells, caseation, nor all these circumstances together are absolutely characteristic of tuberculosis. The only absolutely perfect and certain criterion is the capacity for infection.' Early in 1882 Koch announced the discovery of the *Bacillus tuberculosis*. He proved that this organism was discoverable in all varieties of tubercular disease; that a pure culture of the bacillus might be obtained artificially (see GERM THEORY); and that inoculation of animals with bacilli derived from such cultivation certainly led to a reproduction of the disease, with the characteristic development of further bacilli in the tissues. Koch was thus in a position to claim that the bacillus he had discovered was not only *one*, but *the only*, cause of tuberculosis, and that without the *Bacillus tuberculosis* there could be no tuberculosis. Most searching criticism and observation failed to invalidate his conclusions, and all subsequent experiment has attested the accuracy of his results. Koch's brilliant discovery has ended the fight over tubercle, and sanctioned the definition which prefaces the present article, that tubercle is a new growth, the characteristic product of the *Bacillus tuberculosis*.

The *tubercle bacillus* is a delicate rod-like body (see BACTERIA) of varying length, averaging one-third the diameter of a red blood-corpuscle (*circa* $\frac{1}{7000}$ inch), and approximately one-sixth as broad as it is long. With a powerful microscope, the individual rods present (fig. 1, *a*) a slightly curved form and frequently a beaded outline. The latter is due to the presence of spores. The bacilli occur either singly or in groups. They may be discovered in one or several of the organs of the affected subject, in the blood, in the expectoration (fig. 1), in the urine, or other excretion. They have the special property of being stained in peculiarly 'fast' degree by certain of the aniline dyes, and it is to this fact that we owe their discovery. The bacillus may be cultivated artificially on sterilised blood-serum and other media. The organism is particular as to the nutrient soil, of slow growth, and requires a constant temperature of 86° to 105·8° F. Those facts would seem to indicate that a certain predisposition of tissues plays an important part in the determination of its development in the human subject.

Fig. 1.—Tubercle Bacilli in phthisical expectoration (× about 1500 diameters): *a*, bacilli; *b*, catarrhal cells. (After Crookshank.)

Its *distribution* in the affected subject varies much. It may be either universally disseminated or localised. In the former case the distribution occurs presumably by way of the blood-stream; in the latter, by way of the lymphatic channels or by continuous growth over contiguous surfaces—e.g. over mucous or serous membranes. It may be carried from the original seat of infection to distant parts, where its arrest leads to the production of the characteristic new growth. General miliary tuberculosis may be induced in this way. The organism is also the cause of other conditions, where the eruption of tubercle proper is less observable or is even absent—e.g. glandular and some varieties of pulmonary and intestinal tuberculosis, in all of which, however, the infective agent is the same. Even when tuberculosis is *general* certain organs or tissues are selected for special deposit—e.g. the lung and serous surfaces (pleura, peritoneum, meninges). Various names are in use, according to the organ or structure which is affected, to differentiate the condition from that of simple or other specific inflammation of the given part. Thus, we speak of tubercular meningitis, tubercular peritonitis, pulmonary tuberculosis, renal tuberculosis, &c. But tubercle may be found in almost every part—e.g. lung, larynx, intestine, liver, spleen, kidney, bladder, testicle, brain, choroid coat of eye, bone, skin, blood-vessel, &c. When *localised*, the lung is the favourite seat. Most cases of *general* tuberculosis are traceable to an earlier *local* focus. Thus, general tuberculosis sometimes follows rude interference with localised disease, through the consequent absorption of the tubercle bacillus into the blood-stream. This general or miliary tuberculosis is an acute inflammatory condition with symptoms indicative of severe involvement of the system—e.g. rapid wasting and grave prostration. The course of the disease may resemble to a remarkable degree that

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of enteric (typhoid) fever, with which, indeed, it is sometimes confounded.

Anatomical Characters of Tubercle.—The typical tubercle is essentially a non-vascular nodule. It occurs usually in groups (fig. 2). The nodules

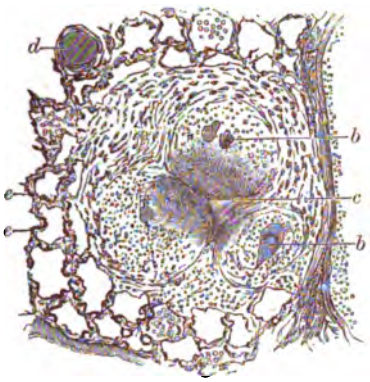

Fig. 2.—Tubercle of Lung (× 50 diams.):
bb, giant cells; *c*, centre of tubercle beginning to caseate; *d*, branch of pulmonary artery; *e*, alveolar framework of lung. (After Hamilton.)

are seen easily by the unaided eye. They are of more or less round shape, and in size approximate a mustard seed. Their outline is well defined and, in the early stage, the colour is grayish. The surface presents a characteristic shimmer. Older nodules, which have undergone degeneration (see below), lose this appearance and assume a whitish-yellow colour. When examined microscopically the tubercle presents, in most instances, a special structure. But this is not constant. The centre is differentiated by the presence of one or more so-called 'giant-cells' (fig. 3). This is a large multinucleated cell, in which the nuclei are disposed in more or less radiating fashion round the periphery. The cell may, or may not, contain the

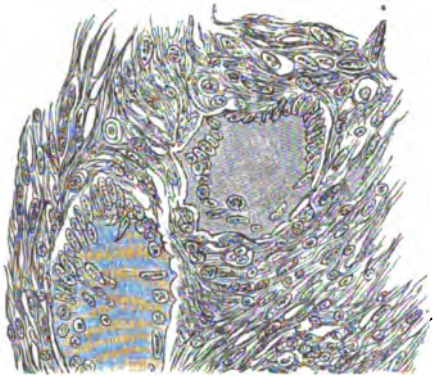

Fig. 3.—Giant Cells from Tubercle of Lung (460 diams.).
The peripheral arrangement of the nuclei is well seen, as also the reticular meshwork external to the cell. (After Wilson Fox.)

tubercle bacillus. From the edge of the giant-cell delicate processes stretch outwards. These form a reticulum, in the meshes of which there occur large epithelium-like cells—so-called 'epithelioid' cells—and still more externally are found smaller rounded cells with one nucleus. But neither the giant-cell nor these other cells can be regarded as absolutely distinctive of tubercle. Atypical varieties of tubercle occur from which those are conspicuously absent, and whose structure appears to differ little from that of fibrous tissue.

Metamorphosis of Tubercle.—Tubercle is liable to certain metamorphoses—the so-called *degenerations*—commonest of which is the *cheesy* or *caseous* (fig. 2, *c*). The frequency of this led to much of the confusion which long existed on the subject. When caseating the tubercle assumes a more opaque and dull appearance, and its colour becomes whitish yellow. The advance of this process has been attributed to the absence of blood-vessels, and the presence of the tubercle bacillus. It is a process of necrosis, or local death of tissue. On the other hand, the reticular elements may become more prominent and the nodule become fibrous.

Infectiveness.—Tuberculosis is contagious. The contagious element is the tubercle bacillus. Koch's early experiments with pure cultures, to which reference has been made, have been verified frequently. The tubercle bacillus has only to be introduced under the skin or into one of the closed cavities of the body to give rise to tuberculosis in the inoculated animal. The bacillus is found in enormous quantities in the sputum of consumptive patients. In some cases the expectoration contains an almost pure culture of the organism. It is to be found also in the juices and secretions of the body; thus it may occur in the milk of tubercular animals.

It may obtain *access to the human subject.* (1) By the respiratory passages. There is evidence for believing that this is most frequently due to the presence of dried particles of tubercular expectoration in the atmosphere. Hence the necessity of greater care than is usually exercised in the disposition of such sputum, and for the disinfection of rooms which have been long occupied by tubercular (consumptive) patients. The tubercle bacillus has been found clinging to the paper and curtains of such rooms, and from organisms thus collected pure cultures have been obtained. It is easy to induce tuberculosis in rabbits and other animals by exposing them in a confined space to the inhalation of a cloud of the dried particles of tubercular sputum. Similarly, the larynx seems to be affected secondarily by the contact of tubercular expectoration from the already affected chest.

(2) By the alimentary tract. Apparently the œsophagus and stomach are strongly resistant to the noxious influence. This is due probably to the frequent movement of the former and the presence of the gastric juice in the latter. The intestine, on the other hand, is readily infected. Thus the swallowing of tubercular matter may set up an intestinal process of this kind. Tuberculosis has been induced in animals whose food has been contaminated with such products. Domestic fowls are liable to the affection from their feeding on expectoration carelessly deposited in their vicinity. As has been seen, the milk from tubercular cows may contain the organism—especially when the udder is affected—and such milk is certainly dangerous; hence the advisability of sterilising milk by exposing it to the influence of heat. Similarly, there is risk from the ingestion of the flesh of tubercular animals; hence the necessity for the thorough cooking of animal food. It has been proved experimentally that tubercular sputum, if boiled, is incapable of inducing the disease.

(3) By wounds. There can be no doubt that inoculation occurs in this way from time to time. But the frequency of such infection is not so great as might *a priori* have been expected. One meets cases, however, where, for example, tubercular sores of the hand have been so induced, and these have, in turn, been followed by involvement of the system generally. The disease known as *Lupus* is a peculiar, localised tuberculosis of the cutaneous tissues, which is probably traceable to superficial inoculation. Its limitation to the surface is charac-

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teristic. The tubercle bacillus has been found in the tissues affected by lupus, and general tuberculosis has occasionally followed surgical interference.

Heredity and Predisposition.—In many cases of tuberculosis there has existed admittedly a predisposition. It is difficult to define the nature and limits of such predisposition. But we may justly reduce the application of hereditary influence, as the phrase was formerly employed. We have to deal probably with the transmission of tissues which are somehow less resistant to the invasion of the special micro-organism. Parents weakened by various causes are likely to produce a progeny with such reduced power of resistance. It is recognised that tissues which resist strongly one variety of attack yield readily to another. Some families are specially liable to one or more of the infective processes, while resisting others. The same may be predicated of races of men and of animals. The influence of heredity may meanwhile be held to be manifested in the transmission to the offspring of tissues which possess a large susceptibility to, or at least a diminished power of resisting, the tubercle bacillus.

Products of Tubercular Growth.—It has been long recognised that the growth of micro-organisms is associated with chemical alteration of the medium in which they develop. This explains the various fermentations, some of which are of much economic value. The artificial cultivation of special organisms has rendered knowledge of those processes and their products more exact. It has been recently proved that, in some instances, such products exert a prejudicial influence on the growing organism itself. When they are separated and mixed with cultivation media, the development of the particular organism has been found to be retarded or prevented. This is illustrated by the group of so-called Toxalbumins. A few years ago it was shown that tubercular expectoration contained a substance or substances of eminently toxic character. Similar extracts were obtained from pure cultivations of the tubercle bacillus. Relatively small doses of these were found to produce serious or even lethal results in animals. More than one attempt was made to utilise those products in relation to the treatment of tuberculosis. In 1890 Koch announced that he had discovered a remedy of large efficacy in many tubercular conditions. In a later communication he detailed the nature of the agent—a forty to fifty per cent. glycerine solution of a pure cultivation of the tubercle bacillus. In this fluid there is present everything from the cultivation that is soluble in glycerine, including extractives, colouring matters, salts, &c. The apparently active part of the extract is insoluble in absolute alcohol, and can be thus separated in less impure form. Koch believes that the agent is a derivative from proteids, to which it is probably closely allied. But inasmuch as it withstands high temperatures and is easily dialysable, it seems likely that it does not belong to the group of Toxalbumins. To the fluid the name Tuberculin, or Tuberculinum Kochii, has been given. But from its character and mode of production it cannot be admitted that the fluid is of absolutely fixed constitution or strength. The introduction of a minimal amount of tuberculin into the subcutaneous tissues of the healthy subject is followed by no conspicuous phenomena. The dose requires to be considerable (0·25 c.c.) to induce pronounced symptoms, and these pass away comparatively rapidly. In the subject of tubercular disease, however, injection of a fractional amount of the fluid induces marked changes, both general and local. The *general* symptoms include rigor, fever, pain in the limbs, languor, vomiting, and cough; the *local* reaction, occurring at the seat of tubercular disease, and not at the point of injection, which is chosen indifferently, is best studied in superficial tuberculosis, especially lupus. In a few hours the parts become swollen and red; later, exudation appears on the surface, which dries and forms crusts. In typical cases the healing process goes on below these. A similar effect is produced, presumably, at tubercular foci, which lie more deeply. Hence Koch was led to predicate both a therapeutic and a diagnostic value. Doubts have been expressed as to the extent of the former. It has been found that many cases of tubercular disease have not improved much under its use. Attention has been drawn to the fact that there is a risk of a wider diffusion of the tubercular disease through its use. On the other hand, it must be acknowledged that a number of cases treated with tuberculin have stood the test of time, and remained cured after many months. It is further certain that the risks which accompany its use in qualified hands have been disproportionately magnified. From the diagnostic point of view, it will be admitted that its value is lessened by the occasional occurrence of a reaction in subjects in whose case there is no suspicion of tuberculosis. But these instances are relatively uncommon.

A review of the experimental and clinical evidence which has been adduced leads to the conclusion that in the discovery and application of tuberculin a great advance has been made, and that for the first time solid ground has been touched in the treatment of tubercular disease, in the elaboration of an agent, related to the peccant organism, which has the power of disturbing the conditions of its growth (Koch), if not of killing the organism more directly. There is reason to expect that the agent will be further refined and its application made more sure and safe through the removal of non-essential and noxious ingredients.

Tuberculosis in Animals.—Tuberculosis is of frequent occurrence among the lower animals. It is especially common in cows and, speaking generally, in stalled animals. 'Perlsucht,' regarding which there has been much discussion, has been proved identical with tuberculosis. The same bacillus is present in the bovine and human disease. There is reason to believe that the conditions of life, in the case of cows, render successful inoculation more likely, while there is the additional risk of contagion in the presence of an already affected animal. Domestic fowls suffer from the disease similarly, as also caged rabbits and guinea pigs. The latter animals take the disease readily by artificial inoculation. It would appear, on the other hand, that dogs, goats, and other animals of more active habits, are less liable to infection. This fact has suggested the treatment of the condition in man by the transfusion of the serum of such animals. This has been attempted by several physicians with apparently fair results. The rationale of the process is, however, doubtful (see GERM THEORY). When occurring in the lower animals the disease may be distributed generally, or restricted to special organs —for example, the lung or mamma. The milk of tubercular animals, especially those whose udders are infected, has been found to contain the tubercle bacillus. The lesions produced by the bacillus are essentially the same as those which occur in the human subject.

Of the immense literature, reference may be made to Klebs, in vol. xx. of the *Real-Encyclopädie der Gesammten Heilkunde* (2d ed.); Hamilton's *Pathology*, vol. i.; Fagge and Pye-Smith's *Principles and Practice of Medicine*. On special departments, see works bearing on this subject by Laennec (1834), Villemin (1868), Virchow (1863-65), Cohnheim (1879), Koch (1882-90), Bollinger (1883), Bang (1885), Woodhead, Heron (1890), and the writer of this article (1890).

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Tuberose (*Polianthus*), a genus of plants of the natural order Liliaceæ, having a funnel-shaped perianth, with six-parted limb, stamens inserted in the tube of the corolla, a superior capsule, and flat seeds. The Common Tuberose (*P. tuberosa*) has rounded bulbous roots; a cylindrical, upright, unbranched stem, 3 or 4 feet high; both root-leaves and stem-leaves sword-shaped, and very acute; flowers spiked and somewhat aggregated, large, pure white, the tube a little in-curved. The plant grows well in the south of Europe, but only bears the open air in more northern climates during summer. The roots are a considerable article of export from the south to the north of Europe. The plant is in high esteem for the beauty and fragrance of its flowers, the odour of which is most powerful after sunset, and has been known to cause headache and asphyxia in a room. The fading flowers emit, in certain states of the atmosphere, an electric light and sparks. The flowers yield an essential oil, which is used by perfumers. The native country of the tuberose is Mexico. The tuberose has been known in Europe for about three centuries. There are double and single flowered forms in cultivation, the former being the more highly esteemed. They are very extensively grown by British and American florists, who, by planting the roots successionally, manage to keep up a supply of flowers at all seasons. Of the double-flowered form there are several varieties, known in commerce as the Double African, the Double American, the Double Italian, and the Pearl. The last named, being less in stature than the others, is preferred.

Double Tuberose (*Polianthus tuberosa*).

Tubes. See PIPES.

Tübingen, an important town of Würtemberg, 20 miles SW. of Stuttgart (35 by rail), is situated on a ridge between the Neckar and the Ammer, in a beautiful and fertile district. Tübingen is an old place, irregularly built, with steep and narrow streets in the main; but the suburbs, especially round about the new university and the railway station, have wide and spacious streets. Book-printing, bookselling, making of chemicals and surgical and physical instruments, milling, dyeing, and trading in field-produce, wine, hops, and fruits form the principal sources of employment, besides education. Tübingen has three Protestant churches (one, the Stiftskirche, dating from 1469–83, and containing the graves of twelve princes of Würtemberg) and one Catholic church. Its university, founded in 1477 by Eberhard im Bart, afterwards first Duke of Würtemberg, soon became a distinguished seat of learning, enjoyed for a time the presence of Reuchlin and Melanchthon, and continued to flourish long after the Reformation had firmly established itself. The Thirty Years' War, however, fatally checked its prosperity; and it was not till the early part of the 19th century that it began to reacquire a reputation. Under Baur (q.v.) it became celebrated as headquarters of the historico-philosophical theology known as the 'Tübingen School,' which has profoundly influenced the study of church history. Its medical faculty is of late distinguished. The university has nearly 100 professors and teachers, a library of 200,000 volumes (located in Duke Ulrich's *Schloss*, on the hill above the town, dating from 1535), and is attended by about 1300 students. Connected with it are an anatomical and physical institute, a botanical garden, a chemical laboratory, &c. There is a Protestant seminary and a Catholic one, in which university lectures are given and theological students reside. Uhland long lived here. Pop. with garrison (1880) 11,708; (1885) 12,251, of whom 1750 were Catholics.

Tuckahoe, or INDIAN BREAD (*Pachyma Cocos*), an underground fungus growing as a saprophyte on the roots of the trees in the southern United States. It is edible, but tasteless.

Tucker, ABRAHAM, was born in London, September 2, 1705, studied at Merton College, Oxford, and entered the Inner Temple, but being rich and unambitious settled down to the quiet domestic happiness of the country gentleman's life, on the estate of Betchworth near Dorking, which he bought in 1727. He died November 20, 1774. All his life long a student of ethical questions, he began about 1756 the preparation of his great work, *The Light of Nature Pursued* (1768–78). Of its seven volumes only three were published in his lifetime, under the name of 'Edward Search, Esq.' Not a regular systematic treatise, but a series of disquisitions on metaphysics, theology, morals, it shows originality, ingenuity of illustration, and solidity of understanding. The standard edition is that edited, with a life, by the author's grandson, Sir Henry Mildmay (1805).

Tucson, capital of Pima county, Arizona, on the Santa Cruz River, 978 miles by rail SE. of San Francisco, with some trade in wool, hides, stock, and gold-dust. Founded by the Jesuits in 1560, it was the capital of Arizona from 1867 to 1877. Pop. (1880) 7007; (1890) 5150.

Tucuman', a north-central province of the Argentine Republic, with an area of 13,500 sq. m. and a pop. (1887) of 210,000. It enjoys a delightful climate, and in the east is very fertile; in the west the country rises to the picturesque Sierra de Aconquija. Stock-raising is an important industry.—The capital, Tucuman, on the Rio Sil, 3 miles from the mountains and 723 miles by rail NW. of Buenos Ayres, contains some handsome public and private buildings, a normal school, and several saw and flour mills and breweries. In the neighbourhood are orange-groves, sugar-plantations, and distilleries. Tucuman was founded in 1564; and here in 1812 Belgrano defeated the Spanish forces, and in 1816 a congress of deputies from the various provinces proclaimed the independence of the La Plata states. Pop. 26,000.

Tude'la, a city in the Spanish province of Navarre, on the left bank of the Ebro, which is here crossed by a bridge of seventeen arches, 46 miles by rail NW. of Saragossa. Tudela is the seat of a bishop, has a Romanesque cathedral, and manufactures of woollens, silk, soap, earthenware. Pop. (1887) 9220. It was the birthplace of the great traveller, Benjamin of Tudela (q.v.).

Tudor, the surname of a family of Welsh extraction which occupied the throne of England from 1485 to 1603. In the Welsh language Tudor is the equivalent of Theodore. Owen Tudor, the first of the race known in history, claimed descent from Cadwallader, and seems to have been godson of Owen Glendower. He fought at Agincourt, became squire to Henry V. and Henry VI. His dancing at some court pageant is said to have first ingratiated him with Catharine of Valois, widow of Henry V., who appointed him to the office of Clerk of the Household, and before long entered into either an illicit connection or a private marriage with him. The indignation of the public

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at this step obliged the queen to take refuge in a convent at Bermondsey, where she died (1437); and Tudor was sent to Newgate, but succeeded in escaping, and in obtaining two audiences of the young king, Henry VI., who afforded him protection and conferred on him the lieutenancy of Denbigh. He fought for the Lancastrians in the Wars of the Roses, was taken prisoner at Mortimer's Cross, and beheaded. Two sons had been born to him by the queen. On the elder, Edmond, the king bestowed the earldom of Richmond, and on the younger, Jasper, the earldom of Pembroke. The Earl of Richmond married Margaret, daughter and heiress of John Beaufort, Earl of Somerset, whose father was an illegitimate son of John of Gaunt; and his son ascended the throne of England as Henry VII. (q.v.). See also the articles on HENRY VIII., MARY, ELIZABETH, EDWARD VI.

Tudor Style, in Architecture, a rather indefinite term applied to the Late Perpendicular (q.v.), and the transition from that to Elizabethan (q.v.). See also FAN-TRACERY.

Tuesday, the third day of the week, is so called from *Tiwesdæg*, the day of Tiw, the Anglo-Saxon name for the god of war (see TYR).

Tuff, or VOLCANIC TUFF, in Geology, the name given to the comminuted rock-debris ejected from a volcanic orifice. The term is usually restricted to the finer kinds of volcanic detritus, or to fragmental igneous rocks in which such fine-grained materials predominate. Thus some tuffs may be described as masses of finely comminuted debris through which are scattered, more or less abundantly, lapilli and angular or subangular blocks of volcanic or other rocks. Other tuffs may consist wholly of very fine-grained materials or of the most impalpable volcanic dust. Most tuffs, whether deposited on a land-surface or accumulated under water, are stratified. Subaqueous tuffs shade off gradually into ordinary aqueous rocks. Thus we have *tuffaceous sandstones* and *tuffaceous shales*, made up of mixtures of volcanic detritus and the ordinary products of aqueous erosion; and many of these rocks are fossiliferous. Subaërial tuffs, likewise, not infrequently contain relics of land plants and animals. Many varieties of tuff are known by special names. Thus *trachyte-tuffs*, *basalt-tuffs*, &c. are rocks composed essentially of the debris of *trachyte*, or of *basalt*, &c. *Pumice-tuff* consists mainly of pumiceous materials —*Trass* being the name given to a variety of pumice-tuff met with in the Eifel. *Peperino* is an earthy granular tuff, containing abundant crystals of various volcanic minerals, which is well developed in the Alban Hills near Rome. *Palagonite-tuff* is a fine-grained tuff, consisting chiefly of minute fragments of volcanic glass, and granules and crystals of volcanic minerals. Formerly the term *tufa* was used as synonymous with tuff. It is now, however, restricted to a rock of chemical origin (see CALCAREOUS TUFA), while, to prevent confusion, *tuff* is seldom used without the qualifying adjective *volcanic*.

Tugendbund ('league of virtue'), a Prussian patriotic union founded at Königsberg in 1808, ostensibly for the promotion of educational, social, and other reforms, but actually cherishing schemes for throwing off the French yoke. Regarded with some suspicion by the Prussian authorities, the association (which had some 400 members, but did not include the national leaders such as Stein or Scharnhorst) was dissolved under pressure from Napoleon in 1809.

Tuileries, PALACE OF THE, built on the site of an ancient pleasure-house called the *Hôtel des Tuileries*, on account of its being built in a locality outside the city where there were several tile-works (*tuileries*). Francis I. bought this property from the Sieur de Villeroy, as a present to his mother, the Duchess of Angoulême. It was afterwards chosen by Catharine de' Medici as the site of a new palace instead of that of Tournelles, and the building was begun in 1564. The palace was burned by the Commune in 1871, and all that remained, save two wings leading to the Louvre, finally removed in 1883. Gardens now occupy most of the site. See PARIS, Vol. VII. p. 764.

Tuke, WILLIAM. See INSANITY.

Tula, an ancient and important manufacturing town of central Russia, capital of a government on the Upa, an affluent of the Oka, 110 miles S. of Moscow by rail. Its churches, its arsenal, museum, and government offices, and the ancient Kreml are the principal buildings. The principal industries are in iron and steel goods, especially the firearms of the great imperial gun-factory or private workshops. The Russian army is largely supplied with muskets and small-arms from the works of this town. Cutlery, locks, *samovars* or tea-urns, mathematical instruments, harmoniums, and bells are also made in great perfection; the Niello-work (q.v.) of Tula is famous; and dyeing, tallow-melting, and the making of soap, candles, sealing-wax, &c. occupy many of the 64,047 inhabitants.

Tulchan Bishops, a term of contempt given to the titular bishops in Scotland, who in 1572 agreed to hold office, letting all the revenues of their charge, except a miserable pittance, be absorbed by the nobles as lay patrons. 'Tulchan' was a calf's skin stuffed with straw, used to induce a cow to give her milk freely.

Tuldja (Roum. *Tulcea*), a Roumanian port in the Dobrudja, just where the Danube divides into its three main branches. Pop. 21,826.

Tulip (*Tulipa*), a genus of plants of the natural order Liliaceæ, having an inferior bell-shaped perianth, of six distinct segments, without nectaries, a sessile three-lobed stigma, a three-cornered capsule, and flat seeds. The bulb is fleshy and covered with a brown skin. Between forty and fifty species are known, mostly natives of the warmer parts of Asia. The name tulip is derived through the French and Italian from the Turkish *tulbend*, Persian *dulband*, originally a Hindustani word, 'a turban.' The most famous of all florists' flowers is the Garden Tulip (*T. gesneriana*), which is from 18 inches to 2 feet high, with a smooth stem, bearing one erect, large flower; the leaves ovate-lanceolate, glaucous, and smooth. The tulip is a native of the Levant; it was brought from Constantinople to Augsburg by Conrad Gesner in 1559, and rapidly spread throughout all parts of Europe. The varieties in cultivation are innumerable. The tulip mania of the 17th century in Holland was the most remarkable of its kind that has ever occurred in horticultural or perhaps any other kind of commerce. Lindley and Moore say: 'Their (tulips') price rose above that of the most precious metals. It is a mistake, however, to suppose that the high prices paid for bulbs—amounting in some instances to 2500 and even 4600 florins—represented the estimated value of a root, since these large sums often changed hands without any transfer of property. Bulbs were bought and sold without even being seen—without even being in existence. In fact, they were the subject of a speculation not unlike that of railway scrip in this country at no very distant date.' The tulip is still most sedulously cultivated in Holland, especially at Haarlem, whence bulbs are largely exported; but attention is almost exclusively devoted to the cheaper varieties, which are used in hundreds or thousands for the purposes of decoration in gardens and rooms

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throughout winter and spring. The purely florists' varieties, which gave rise to the tulip mania, are not suited for this purpose; they are nowhere now cultivated more zealously than in England, by a limited band of connoisseurs in the home counties and in Lancashire. The tulip is prized merely for the size and beauty of its flowers, its smell being rather unpleasant. Great attention is paid to the cultivation of tulips, not only in the gardens of the wealthy, but often in those of the humbler inhabitants of small towns and villages, in which beautiful beds of tulips may often be seen. Tulips succeed best in a light, dry, and somewhat sandy soil. Bulbs are planted in the end of October, or beginning of November, and the flowers are produced early in summer. Beds of choice tulips are protected in spring by hoops and mats; and in the flowering season an awning of thin canvas is spread over them, which greatly prolongs the duration of their beauty, as they are soon spoiled by exposure to strong sunshine. Tulips are propagated by offset bulbs, and new varieties are raised from seed. Another species of tulip cultivated in gardens is the Sweet-scented Tulip, or Van Thol Tulip (*T. suaveolens*), which has yellow or red flowers, inferior to those of the common garden tulip in beauty, but prized for their fragrance, and for appearing more early in the season. It is often cultivated in pots in windows. It is a native of the south of Europe. The Wild Tulip (*T. sylvestris*), a native of many parts of Europe and Asia, is admitted into the British flora, but is a very doubtful native of Britain. It is common in the woods and vineyards of Germany and the south of Europe. It has a slender stem, narrow lanceolate leaves, and a somewhat drooping, fragrant, yellow flower. It develops offset bulbs at the end of fibres thrown out from the root, at some distance from the parent plant. Its bulbs are eaten in Siberia, although bitterness and acridity characterise all the bulbs of this genus.

Tulip Tree (*Liriodendron tulipifera*), a beautiful tree of the natural order Magnoliaceæ, a native of the United States, having a stem sometimes 100 to 140 feet high and 3 feet thick, with a grayish-brown cracked bark, and many gnarled and easily broken branches. The leaves are roundish, ovate, and three-lobed, the middle lobe obliquely truncated. The flowers are solitary at the extremities of the branchlets; they resemble tulips in size and appearance. The bark has a bitter, aromatic taste, and, like that of all the Magnoliaceæ, contains a bitter principle, called *Liriodendrin*, which has been used as a substitute for quinine in fevers. The tulip tree is one of the most beautiful ornaments of pleasure-grounds wherever it grows, and flowers well—in Britain, however, only in the southern parts. It does not flower freely till the tree is from twenty to thirty years of age. It is now plentiful in many parts of the south of Europe. In some parts of the basin of the Mississippi it forms considerable tracts of the forest. The heart-wood is yellow, the sap-wood white. The timber is easily wrought, takes a good polish, and is much used for many purposes.

Tulip Tree (*Liriodendron tulipifera*).

Tullamore, the chief town of King's County, Ireland, is situated on the Grand Canal, 59 miles WSW. of Dublin by rail, and is a well-built agricultural town with some local trade. Pop. 5098.

Tulle, capital of the French dept. of Corrèze, at the confluence of the Solane and the Corrèze, 61 miles by rail ENE. of Périgueux. Its 12th-century cathedral was partly demolished in 1793; the principal industry now is the manufacture of small-arms. Pop. (1872) 11,848; (1891) 15,384.

TULLE, named from this place, is no longer made here. It is a kind of thin silk network fabric of a very open structure, used for the trimmings of ladies' dresses, and also for caps and veils. Of late years other light fabrics, especially silks of a different make, have largely taken its place for parts of dresses.

Tulloch, JOHN, an eminent Scottish divine, was born at Bridge of Earn, in Perthshire, June 1, 1823, studied at St Andrews and Edinburgh, and was licensed to preach in 1844. Next year he accepted the charge of St Paul's at Dundee, in 1849 was presented to Kettins in Forfarshire, and was appointed in 1854 principal and primarius professor of Divinity in St Mary's College, St Andrews. Appointed in 1859 one of the Queen's chaplains, he became senior principal at St Andrews in 1860, deputy-clerk of the General Assembly in 1862, Clerk in 1875, and Moderator in 1878, and died at Torquay, February 13, 1886. From an early age he contributed to the magazines—*North British Review*, *British Quarterly*, and later the *Contemporary Review* and *Fraser's Magazine*, of which last he was for some time editor. His first book was the second Burnett prize essay on *Theism* (1855), and this was followed by *Leaders of the Reformation* (1859), *English Protestants and their Leaders* (1861), *Beginning Life* (addressed to young men, 1862), *The Christ of the Gospels and of Modern Criticism*—an answer to Renan (1864), *Rational Theology and Christian Philosophy in the Seventeenth Century*—altogether an admirable work, discussing with equal sympathy and insight the Falkland group and the Christian Platonists (2 vols. 1872), *Facts of Religion and Life* (sermons, 1876), *Pascal* in Blackwood's 'Foreign Classics' (1876), *The Christian Doctrine of Sin*—the Croall Lectures at Edinburgh (1877), *Modern Theories in Philosophy and Religion* (1884), and *Movements of Religious Thought in Britain during the Nineteenth Century* (1885). Tulloch was a fearless Liberal alike in politics and theology. His conception of an Established Church involved the idea of a comprehensiveness and tolerance unusual to Presbyterian theology, and he laboured throughout life to lay down the sure foundations on which a rational yet reverent Christianity might be firmly built, which should be distinguished by its inwardness and spiritual elevation rather than by the rigidity of its definitions. The strength and earnestness of his own religious convictions, his large-hearted benevolence, catholic sympathy and broad culture, his noble presence and impressive oratory made him conspicuous among men, whether on the floor of the Assembly, on the platform, or in the pulpit. See Memoir by Mrs Oliphant (1888).

Tumble-weed, or ROLLING-WEED, a name given to several plants whose globular flowering heads are detached in autumn, and rolled about, scattering their seed. Such are various species of Amarantus, Psoralea, Corispermum (Bug-seed), and Cycloloma (Winged Pig-weed).

Tummel. See RANNOCH.

Tumour (Lat. *tumor*, 'a swelling') is the term applied in medicine to new formations characterised generally by their 'independent growth and almost independent life, so little do they appear to

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concern themselves with the interest of the body as a whole;' 'their tendency to continuous growth;' and 'the tenacity with which they maintain their hold upon the individual, rarely disappearing or even diminishing in size.' They are thus separated on the one hand from simple hypertrophy of organs normally present, and on the other from inflammatory swellings, and the enlargements associated with syphilis, tubercle, glanders, &c. Many cysts, however, though grouped with tumours, are merely enlargements of normal cavities (see CYST).

The most important division of tumours is that into *innocent* or *benign* and *malignant* tumours. The malignant tumours tend (1) to grow continuously into the tissues surrounding them, irrespective of the natural boundary lines between different structures; (2) to recur after removal; (3) to cause secondary growths of the same nature in the neighbouring lymphatic glands, (4) and in distant parts of the body. Malignant tumours of different structures and in different organs possess these characters in varying degrees, and may not manifest them all; but if malignant at all they are dangerous, and certain sooner or later, if unchecked, to destroy life. Innocent tumours, on the other hand, are sharply marked off from the surrounding tissues, tend to grow by pushing aside, rather than by invading adjacent structures, do not return after removal, and do not lead to the occurrence of similar growths in other parts, though several or even many of them may be present in the same patient. They may cause death by interfering, on account of their situation, with the function of important organs, by becoming the seat of ulceration and hæmorrhage, &c.; but they have not the intrinsic dangers of the other group.

With regard to the causes of tumours little is known. In some cases they can be traced to the effects of injury or of long-continued irritation of a part, though the reason why they should so arise in a particular individual is often inexplicable; in some cases heredity seems to be an important factor in their occurrence. But 'in the large majority of cases they are formed without any apparent cause.' The organs most frequently affected are the womb and the female breast; hence they are on the whole more common in the female sex. But some organs common to both sexes are affected almost exclusively in males (e.g. the lip by cancer).

With regard to treatment, simple tumours demand removal, generally speaking, only when they give rise to discomfort or disfigurement; malignant tumours should be removed, if removal is practicable, at the earliest possible moment. With few exceptions removal by the knife, écraseur, or cautery is the only method of dealing with them.

The solid simple tumours resemble more or less closely the fully developed structures of the body, generally of the part in which they grow, and are classified accordingly. The most important groups are the fatty tumours (lipoma), the most frequent of all; the fibrous (fibroma); the cartilaginous (enchondroma); the bony (exostosis); the vascular (Nævus, q.v.); the warty (papilloma); and the glandular (adenoma). The malignant tumours are either aberrant developments of epithelium (carcinoma; see CANCER), or resemble imperfectly developed tissues (see SARCOMA).

Tumult. See RIOT.

Tumulus. See BURIAL, BARROW, CAIRN.

Tun, an obsolete liquid measure of capacity; in old ale and beer measure, 216 gallons; in old wine measure, 252 gallons. As a tun of water weighs a little more than 2000 lb., it is probable that the ton weight (see TON) was taken from the tun measure.

Tunbridge, or TONBRIDGE, a market-town of Kent, 29½ miles SE. of London, stands on the Medway, which here divides into six streams, one of them called the Tun. A castle, originally Norman, but largely rebuilt in 1280–1300, and held successively by Fitz-Gilberts, De Clares, Audleys, and Staffords, retains a fine Early Decorated gatehouse. The parish church, also Decorated in style, was almost rebuilt in 1878; and the grammar-school, founded in 1553 by Lord Mayor Sir Andrew Judd, occupies handsome new buildings of 1865. Remodelled in 1880, it has a rich endowment of £5500 a year, and over 300 boys; Sir Sidney Smith was an alumnus. The manufacture of toys, boxes, and other articles in 'Tunbridge ware' (a kind of wood mosaic in veneer) is a specialty. Pop. (1861) 5919; (1891) 10,123.

See works by T. P. Fleming (1865) and, on the school, by S. Rivington (1869).

Tunbridge Wells, a charming inland watering-place, on the border of Kent and Sussex, 5 miles S. of Tunbridge and 34½ SSE. of London. It occupies the head and slopes of one of the valleys of the Weald, and has in general a south-west aspect, commanding very fine views. The chalybeate waters, situated at the end of a parade called the 'Pantiles,' were discovered by Lord North in 1606, and patronised in 1630 by Henrietta Maria. Puritans also resorted hither, and to them the place owes such names as Mounts Ephraim and Sion; whilst among later visitors have been Catharine of Braganza, Evelyn, Queen Anne, 'Beau' Nash, Richard Cumberland, Dr Johnson, Richardson, Garrick, Chatham, and Queen Victoria. There are a breezy common of 170 acres, a church (1685) in two counties and three parishes, a public hall (1870), a new pump-room (1877), a friendly societies' hall (1878), and a considerable trade in 'Tunbridge ware.' The season lasts from July to September. Tunbridge Wells was incorporated as a municipal borough in 1889. Pop. (1851) 10,587; (1891) 27,895.

See works by J. Britton (1832) and, on the flora, by R. Deakin (1871); also Macaulay's third chapter, and Thackeray's *Virginians.*

Tundra, the vast plains which border on the Arctic Ocean. See DESERT, SIBERIA.

Tungsten (sym. W, equiv. 183·5), a rare metal, chiefly derived from Wolfram (whence the symbol W), which is a tungstate of iron and manganese, and likewise found in Scheelite, which is a tungstate of lime. The metal (Swed. *tung-sten,* 'heavy stone') is obtained either as a dark-gray powder or in heavy iron-gray bars, which are very hard and difficult of fusion, and have a specific gravity of 19·1. Aqua regia and nitric acid convert it into tungstic acid. When 10 parts of this metal are alloyed with 90 of steel a mass of extraordinary hardness is obtained. Tungsten forms two compounds with oxygen—viz. a binoxide, WO_2, which is obtained in the form of a brown powder by heating tungstic acid to low redness in a current of hydrogen, and which does not form salts with acids; and an acid oxide, known as *tungstic anhydride,* WO_3. Various tungstates have been formed and examined. Of these the most important is the tungstate of soda, which answers admirably as a means of preventing muslin, &c. from bursting out in a flame when brought in contact with fire.

Tunguses, an ethnographic group of the Ural-Altaic family; see SIBERIA, Vol. IX. p. 428.

Tunic (Lat. *tunica*), the Roman equivalent of the Greek *chitōn,* the chief under-garment of Greeks and Romans of both sexes. In its ordinary form it consisted of a plain woollen shirt, girded round the loins and reaching to about the knees, with two

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short sleeves covering the upper part of the arm. Over this loose outside draperies in various forms were worn, as the Greek *pallium* and the Roman *toga*. The women's tunics (Lat. *stola*) were usually longer and looser than those of men, and were fastened under the bosom instead of round the loins.

Tunicata, or UROCHORDATA, a class of remarkable animals, many of which are popularly known as Ascidians (q.v.) or sea-squirts. As is explained in the article on Ascidians, the Tunicates are now regarded as occupying a lowly place among vertebrate or chordate animals. This is proved by the characteristics of the larval forms, and also by three or four genera—e.g. Appendicularia (q.v.)—which retain throughout life the vertebrate characteristics which the great majority lose in the degeneracy of their adult life. The class includes three orders —(1) Larvacea, of which Appendicularia is type; (2) Ascidiacea, or Ascidians; and (3) Thaliacea, free-swimming forms— Salpa (q.v.) and Doliolum.

See W. A. Herdman, 'Tunicata,' *Challenger* Reports, vi. 1882; xiv. 1886, &c.

Tuning-fork, a contrivance for regulating the pitch of the voice or of a musical instrument. It consists of two prongs of steel springing from a handle, and so adjusted as to produce a fixed note when struck. It is usually tuned in C in Britain and in A in Germany, but there is great diversity as to what should be the pitch of C (see PITCH). There are forks which are capable of adjustment to different standards of pitch by means of a movable brass slider fitted with a screw. Tuning-forks are much used in experiments on Sound (q.v.).

Tunis, a French protectorate of North Africa, bounded on the N. and E. by the Mediterranean Sea, on the W. by Algeria, on the S. by the Sahara, and on the SE. by Tripoli. It has an area of 45,000 sq. m., and a coast-line of 550 miles. The population, mostly Bedouin Arabs and Kabyles, is estimated at 1,500,000, including 10,000 French troops. Numerous bays and arms of the sea indent the coast, and branches and spurs of the Atlas range penetrate the interior. The country, indeed, is mostly high ground, a large proportion of its surface being occupied by hills and, towards the south, by desert steppes, seldom visited by rain. In the east the land is low and sandy. None of the rivers are navigable, most of them disappearing in the sand before reaching the coast. There is but one considerable lake; it lies towards the north. The soil is largely fertile, producing fine grain-crops. Fruit-culture is extensively engaged in, and oranges, dates, figs, olives, grapes, pomegranates, and almonds are raised. The pasturage is good and abundant, except in the height of the dry season, supporting numerous flocks of cattle and sheep. Tunis is rich in all minerals except gold. In late years quarries of fine and very beautiful marble have been discovered and worked, the character of the stone and the traces of ancient workings making it probable that from this district came the precious 'Numidian marbles' of the Romans. Towards the west lava and other volcanic rocks are presented.

The rainy season lasts from October till March, when the precipitation is plentiful over the whole country, with the exception of the desert steppes, as previously noticed. The annual rainfall varies from 10 to 50 inches. The heaviest rains occur in December and January, accompanied by north and north-west winds. Snow falls on the higher altitudes, and the greater mountain-peaks are always snow-clad. Showers are few during the great heat, and dew is unknown except near the sea, and even there it disappears at or a little before sunrise. Although often trying for Europeans, the climate cannot be called exceptionally unhealthy, but much depends on the situation.

The trade of Tunis is gradually increasing, but the value of the imports (about £1,240,000 per annum) is still nearly £50,000 per annum above that of the exports. Three-quarters of the cargoes are carried in French bottoms, Italy ranking second and Great Britain third. Commerce is carried on principally with the following countries, arranged according to the value of the imports received from each—viz. France, Algeria, Malta, Italy, Russia, Austria, and Great Britain. The exports are sent principally to Italy, France, Algeria, Great Britain, Malta, and Austria. The articles chiefly imported are cottons and textile goods, flour, cereals, colonial wares, and wines. The exports largely consist of olive-oil, wheat, tan, alfa, barley, fruits, wool and woollen goods (including *chechias*, or caps of red wool), sponges, and tunny-fish (in tins and salted). There are 260 miles of railways, with over 2000 miles of telegraphs. The piastre, with an average value of about sixpence, is the standard of monetary value; but French and Italian gold and silver coins circulate freely.

For the early history, see CARTHAGE. When European powers first began to recognise the utility, if not necessity, of occupying foreign shores with the view of commanding freedom in the transport of troops and merchandise, Tunis, from the facilities which its numerous bays and ports gave to movements in the Mediterranean, seems to have particularly engaged the attention of France, and in 1270 Louis IX. invaded the country, being assisted by the king of Navarre. Although his landing was unopposed, the troops suffered much from sickness, the king and his son falling early victims to disease. Notwithstanding the invaders managed to bring their enterprise to a successful issue. In 1575 Sinan Pasha brought the country completely under the Ottoman power, giving it a new constitution. The government was invested in a Turkish pasha as governor, with a council composed of the principal officers of the Turkish troops and the commander of the Janizaries. But in a few years a military mutiny overturned matters, and a dey, with limited authority, was raised to power, the chief executive functions being retained by the council, a bey being put at the head of the revenue and taxation departments. By slow degrees this officer so extended his influence and authority that at last Murad Bey succeeded in raising himself to the hereditary sovereignty, and his family governed Tunis for a century, enlarging their borders by conquests on land and greatly increasing their own and the country's opulence by piracy, directed against the Christian powers, by sea. In the 18th century, after a series of reverses, Tunis became tributary to Algeria; but in the beginning of the 19th century the country, under Hamuda Pasha, became again virtually independent. Under its later sovereigns, generally men of an enlightened and wisely-reforming spirit, Tunis made great progress. In 1881 France invaded Tunis, under pretext of chastising the Kroumir tribes which had been making incursions into Algeria; this invasion resulted in the signing of a treaty placing the country practically under French protection, under which it has made satisfactory progress. This occupation is the most important to France of any that she has undertaken in late years, as it gives her to a large extent the command of the Mediterranean and important coast-line, the use of many and secure harbours, and makes her the mistress of North Africa, besides, to a certain degree, lessening the strategic importance of Gibraltar and Malta.

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See *The Piratical States of Barbary* (anonymous), Broadley's *Tunis Past and Present*, Banning's *Le Partage Politique de l'Afrique*, Arènes's *Vingt Jours en Tunisie*, Mayet's *Voyage dans le Sud de la Tunisie*, Lanessan's *La Tunisie*, Norman's *Colonial France*, Graham and Ashbee's *Travels in Tunisia* (with full bibliography, 1887; the *Bibliography* continued by Ashbee in 1890), Silva White's *Developmnt of Africa* (1890), and Poiré, *La Tunisie Française* (1892).

TUNIS, the capital, is situated on a small lagoon (El Bahira), near the south-west extremity of the Lake of Tunis, and about 3 miles from the ruins of Carthage (q.v.). The streets are narrow, filthy, and unpaved, but the bazaars are well supplied with oriental goods, fruits, and some of the chief imports. The mosques are always worth visiting, and several of them are magnificently decorated, as is the bey's palace. The citadel, the old slave prison, contains a fine collection of arms and objects of antiquarian interest. A channel 81 feet broad and 11½ deep has been dredged in the lagoon from Goletta to Tunis, where harbour-works have been constructed. There are manufactures of cloth and clothing, olive-oil, tapestries, leather, soap, and wax. Good modern barracks are occupied by the French troops, who have made their surroundings healthy and, to a certain extent, pleasant to the eye, but much remains to be done in the way of sanitary improvement within the city itself. Pop. 134,000. See Lallemand, *Tunis et ses Environs* (1889).

Tunkers (Ger., 'Dippers'), by corruption *Dunkards* (but by themselves called 'the Brethren'), a religious sect found chiefly in Pennsylvania, Maryland, Virginia, Ohio, Indiana, Illinois, Iowa, Missouri, Nebraska, and Kansas. Altogether they number nearly 100,000, and are almost confined to the United States, although small bodies exist in Denmark and Sweden. Yet the sect had its birth in Germany, being indeed a child of the Pietist movement of the 17th century; but between 1719 and 1729 all the members, harassed and persecuted at home, had, on Penn's old invitation, removed to Pennsylvania, and settled about Germantown and Philadelphia, from whence they gradually spread southward and westward. In their creed the Brethren are thoroughly evangelical. Baptism they administer by trine immersion (hence their name), and only to adults. Love-feasts are held in each congregation twice a year, preceded by washing of feet, and followed by the giving of the right hand of fellowship and the kiss of charity (women with women, and men with men), and then by the communion. Each congregation is independent, and elects its own deacons, ministers, and elders or bishops; the latter, who preside over the congregations, are chosen (generally by seniority) from among the ministers (who are authorised to baptise, marry, and preach). Ministers are supported by the church if they are poor or are sent out as missionaries, but as a rule no salaries are paid. There are district and general conferences for the settlement of questions not entirely local. Other customs of the sect that deserve notice are their plain and generally uniform dress, their avoidance of litigation, of war, and of any active share in politics; they take no oaths, and so may not join (or if converts remain members of) any secret society. Divorce and re-marriage are unknown among them, but the stories of their celibacy or discouragement of marriage are without foundation. They anoint the sick with oil; and they are total abstainers, and discourage the use of tobacco. Most of the Brethren are engaged in farming. They possess four schools or colleges, at Huntingdon, Pennsylvania, Mount Morris, Illinois, Bridgewater, Virginia, and McPherson, Kansas; the publishing headquarters are at Mount Morris.

Tunnel, an arched passage driven through an elevation, or mountain, or under a river. They may be divided into land or subaqueous tunnels, and according to their purpose into railway or canal tunnels, tunnels for sewage, water-supply, &c. Tunnels have been in use from an early period in history, notable ancient ones being those under the Pyramids (q.v.), that for draining Lake Fucino (q.v.), and the Cloaca Maxima (q.v.). But it is since the 16th century that they have been most largely used. From the difficulties and uncertainty connected with their construction, they have proved to be the most costly part of the work in making canals and railways, averaging from £45 to £60 per lineal yard. In making a tunnel, the nature of the material to be excavated is first ascertained by vertical shafts at different points in its length. Some of these are temporary, others are permanent, and serve for ventilation when the tunnel is completed. These shafts must not be less than 9 feet in diameter, so as to admit of lowering and raising men and the material excavated, fixing pumps, &c. When the workmen have reached the top of the tunnel they begin by excavating in opposite directions, and thus, independent of the two ends, many faces can be worked at the different shafts, until a small 'adit' or hole is driven through its entire length. This first passage when completed through rock is 6 or 7 feet high and along the top of the tunnel; the centre line is then marked off, and the adit or passage enlarged at the sides and bottom to the required dimensions. Sometimes in hard rock no brick lining is required. If, however, the material excavated is clay, loose soil, or friable rock, the full size of the tunnel is carried forward from the beginning, the brick lining following close up to the faces of the excavations. Tunnels through lofty mountains, or below rivers or arms of the sea, can only be worked from the two ends, vertical shafts being inadmissible, and from the experience gained in recent years in tunnels of great length, and with improved boring and drilling-machinery driven by compressed air, combined with the use of more powerful blasting materials, it is probable that the older methods of constructing tunnels from vertical shafts will be superseded in, the future, the comparative progress under equal conditions being in favour of the newer machinery by as much as three and four to one. Important departments of the work of tunnel-making have been already discussed in the articles Blasting (q.v.) and Boring (q.v.); see also MINING. There are sixty-eight tunnels on canals and nearly 87 miles on the railways of Great Britain. The Channel Tunnel (q.v.) remains a project. See also AQUEDUCT, PNEUMATIC DESPATCH, RAILWAYS.

The longest in the world are the Alpine mountain tunnels under the St Gotthard (9¼ miles; 1872–80), the Mont Cenis, and the Arlberg, noticed under their several heads, as are also the other more important tunnels (see HOOSAC MOUNTAIN, ST CLAIR, &c.). The 'Underground Railway' in London is practically a series of tunnels. The old Thames Tunnel of Brunel (1825–43) is now used for a railway. In 1891 the London County Council arranged for the construction of a new Thames Tunnel at Blackwall (to be 4464 feet long). The longest canal tunnels in England are the Marsden, on the Huddersfield Canal (5280 yards; opened 1798), and the Sapperton, on the Thames and Liverpool (4300 yards; 1790). The longest railway tunnels are the Severn tunnel (7665 yards; 1886), the Dore and Padley (6200 yards; 1892), the Stanbridge (5342 yards; 1839), and the Woodhead (5297 yards; 1867).

Tunny. The tunnies belong to the mackerel family, or Scombridæ, and have somewhat the

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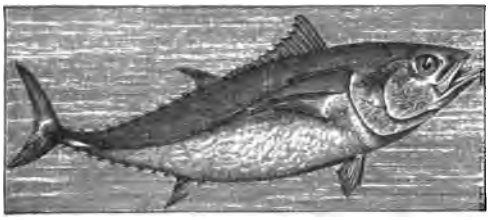
appearance of gigantic mackerel. There are several genera and species. The Common Tunny (*Thynnus vulgaris* of Cuvier, *Orcynus thynnus* of Günther) is the *thynnus* of the ancients. It is a large fish, reaching 9 feet in length, and 1000 lb. in weight. It occasionally occurs on the British coasts, but is particularly abundant in the Mediterranean. It has a large mouth with small teeth; two dorsal fins, the first elongated and reaching nearly to the second, which is shorter; behind the second dorsal and anal are eight or nine finlets like those of the mackerel. There is a keel on



The Common Tunny (*Thynnus vulgaris*).

each side of the free portion of the tail, and the tail fin is crescentic. There are small scales all over the body, but they are larger in the anterior part, where they form a well-defined corselet. An air-bladder is present. The tunnies approach the coasts in summer, chiefly for the purpose of spawning, and it is at this time that the fishery is carried on. Like the mackerel, the fish are gregarious and migratory, but it is untrue that they all leave the Mediterranean in autumn, as was formerly supposed. The Phœnicians established a tunny fishery at a very early period on the coast of Spain, and the tunny appears on Phœnician medals of Cadiz and Carteia. Salted tunny was much esteemed by the Romans, and was called *Salta-mentum Sardicum*. The tunny is generally captured by means of nets arranged in a funnel-like form, the fish entering the wide mouth of the funnel, and being gradually driven to the narrow end, where they are killed by lances and harpoons. The line of nets is often more than a quarter of a mile long. The principal fisheries at the present day are at Cadiz, the Gulf of Lyons, Corsica, Sardinia, Sicily, Tunis, and in the Black Sea. At Tunis most of the fish are cut up and preserved in olive-oil, and exported in tins; others are salted and sent to Malta and Sicily, but fetch only half the price of those in oil. The common tunny also occurs on the western side of the Atlantic, from the Caribbean Sea to Newfoundland. The Long-finned Tunny (*Orcynus germo*) is distinguished by the great length of the pectoral fins; it is scaled all over, and the corselet is ill-defined. It is much smaller than the common tunny, seldom reaching 3 feet in length. It is caught by long and strong 'whiffing' lines trailed from a boat, the fishery being principally carried on in the south part of the Bay of Biscay. A few stragglers have been caught on the coasts of Devon and Cornwall, but its ordinary range is from the Bay of Biscay to the Cape of Good Hope. The Bonito (q.v.; *Thynnus pelamys*) has no scales at all on its body except in the corselet. *Pelamys sarda* has very fine scales on the posterior part of the body, and a small corselet. *Auxis rochei* is distinguished by the distance between the two dorsal fins; its weight does not exceed 6 lb. A few other species of these genera occur in the Pacific and Indian Oceans.

Tunstall, a market-town of Staffordshire, 4½ miles NNE. (and since 1885 within the parliamentary borough) of Newcastle-under-Lyme. It has a town-hall (1884), manufactures of earthenware and iron, and neighbouring collieries. Pop. (1811) 1677; (1851) 9666; (1891) 15,730.

Tunstall, CUTHBERT, was born at Hackforth in Yorkshire in 1474, brother of the Sir Brian Tunstall who fell at Flodden. He was educated at Oxford, Cambridge, and Padua, and became in turn Rector of Stanhope, Archdeacon of Chester, Rector of Harrow-on-the-Hill, Master of the Rolls, Dean of Salisbury (1519), Bishop of London (1522) and of Durham (1530). In 1516 he went on an embassy to Charles V. at Brussels, and there formed a fast friendship with Erasmus. Between 1516 and 1530 he was often employed on embassies to France and Germany, and in 1527 he had accompanied Wolsey on his magnificent embassy to France. He accepted the Royal Supremacy, but took alarm at the sweeping measures of reform under Edward VI., and was at length in 1552 deprived, through the influence of Northumberland, who coveted the wealth of the see. The accession of Mary restored the bishop, but under his mild rule not a single victim died for heresy throughout the diocese. On Elizabeth's accession he refused to take the oath of supremacy and was deprived, September 29, 1559. About six weeks after he died at Lambeth in the house of Archbishop Parker, and was buried in the chancel of Lambeth church. Tunstall was a ripe scholar and an admirable man, but left little beyond a defence of transubstantiation and a number of Latin prayers. He was uncle to the famous apostle Bernard Gilpin.

Tupelo (*Nyssa*), a genus of trees, natives chiefly of the southern parts of the United States, having simple alternate leaves, mostly entire, greenish inconspicuous flowers at the extremity of long stalks, the fruit a drupe. *N. villosa* attains a height of 60 to 70 feet. It is often called Black Gum Tree. *N. tomentosa*, the Large Tupelo, is a lofty and beautiful tree, remarkable for the extraordinary enlargement of the base of the trunk, which is sometimes 8 or 9 feet in diameter, whilst at no great height the diameter diminishes to 15 or 20 inches. The fruit resembles a small olive, and is preserved in the same way by the French settlers in America. *N. candicans* or *capitata*, the Ogeechee Lime or Sour Gum Tree, is a small tree, of which the fruit is very acid, and is used like that of the lime. The wood of all the species is peculiarly curled in the grain, rendering the fibre very tenacious and difficult to split, and is in request for making naves of wheels, hatters' blocks, &c., but is not otherwise valuable.

Tupper, MARTIN FARQUHAR, D.C.L., F.R.S., poet and inventor, was born at Marylebone, 17th July 1810. His father, an eminent London surgeon, who twice refused a baronetcy, came of a family, originally German, which since 1550 had been settled in Guernsey. Martin was educated at the Charterhouse and under five private tutors, and at nineteen went up to Christ Church, Oxford. A stammer hindered him from taking orders, so, after graduating in 1831, he entered Lincoln's Inn, and in 1835 was called to the bar. But a single will and marriage settlement was his first and last exploit in the way of law; he had found his vocation in a life of authorship. Its chief events were his election to the Royal Society (1845), two visits to America '1851, 1876), and a series of English and Scotch readings from his own works. Of those works, forty in number, one, *Proverbial Philosophy* (3 series, 1838-67), brought him and his publisher, Hatchards, a profit of 'something like £10,000 apiece.' His inventions were not such successes (safety horseshoes, glass screw-tops to bottles, steam-vessels with the paddles inside, &c.). A

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friend 'whose ambition it was to be Tupper's Boswell' predeceased him; but from his own huge 'archives' he compiled *My Life as an Author* (1886)—a curious self-study of a poet. He died at Albury, his Surrey home, on 29th November 1889.

Turanian, a philological term apt to be misleading and now going out of use. Originally the word *Turan*, meaning '*not Iran*,' was used by the Sassanian kings of Persia for those parts of their empire outside of Iran (q.v.), and the Persians still know Turkestan under this name. Hence in philology 'Turanian' came to be used for the non-Aryan languages (see ARYAN RACE) of those regions—languages of the Ural-Altaic or Finno-Tartar group (see ASIA, Vol. I. p. 493). But the term was extended sometimes so as to include the Dravidian tongues of India, also of the agglutinative type (see PHILOLOGY, Vol. VIII. p. 126); thus erroneously suggesting affinity between non-Aryan and non-Semitic groups of languages which are probably quite unconnected (see URAL ALTAIC).

Turbary, in the law of England, is a right to go upon the soil of another and dig turf, and carry away the same.

Turbellarian. See PLANARIAN.

Turberville, GEORGE (about 1530–1600), poet and secretary to Sir Thomas Randolph (q.v.), wrote epigrams, songs, sonnets, *The Booke of Faulconrie* (1575), *The Noble Art of Venerie* (1576), an unpublished translation of Tasso, &c.

Turbine. See WATER-POWER.

Turbot (*Rhombus maximus*), a fish of the family Pleuronectidæ or Flat-fishes. The genus Rhombus includes the turbot and brill only among British flat-fishes: its distinguishing characters are that the eyes are on the left side, the ventral being anterior, the mouth terminal and large, with teeth on both sides, the shape rhomboidal, and that the lateral line has a semicircular curve above the pectoral fin. The dorsal fin commences on the snout in front of the eyes, and its rays like those of the ventral are branched. The turbot is distinguished from the brill by the fact that it has no scales, but on the upper side bony plates in the skin from which blunt tubercles project: it is also broader in proportion than the brill. The adult turbot is about 2 feet long, and it has been known to reach a weight of more than 30 lb. It feeds principally on other fishes, but also on crustaceans,

Turbot (*Rhombus maximus*).

molluscs, and echinoderms. It occurs on sandy ground all round the British and Irish coasts, becoming rarer towards the north. The largest supply comes from the North Sea. It breeds in summer: the eggs are very small and are buoyant or pelagic. Buckland calculated the number of eggs in a single female at over fourteen millions. The young, unlike those of other flat-fishes, are provided with an air-bladder, and continue to swim at the surface during their metamorphosis. At this period of life they approach the shores, and are found in harbours and bays. After the metamorphosis the young fish remain in shallow water, where also larger specimens occur in summer-time. The turbot in the market is only surpassed in price by the sole: its average price on landing in 1890 was 7d. per lb. The total value of turbot landed in that year in the United Kingdom was £58,831. Owing to its predaceous habits and large mouth, the turbot is caught on hooks as well as by the trawl. The range of the turbot extends along the coasts of France and in the Mediterranean as far as the Adriatic. Like the sole, it is entirely absent from the American coast. *R. maculatus*, the only American representative of the genus, found on the coasts of New England and New York, is of little value as food from the extreme thinness of the body, to which it owes its common name of 'window-pane.' It rarely exceeds a pound or two in weight. Another species, *R. mæoticus*, occurs in the Black Sea.

Turcomans. See TURKESTAN.

Turcos, a popular name for the Tirailleurs Algériens, a body of native Algerian troops recruited for the French service.

Turdidæ. See THRUSH.

Turenne, HENRI DE LA TOUR D'AUVERGNE, VICOMTE DE, one of France's military heroes, was the second son of the Duke of Bouillon and Elizabeth of Nassau, daughter of William (I.) of Orange, and was born at Sedan, 11th September 1611. Brought up in the Reformed faith, he was sent, on the death of his father in 1623, to Holland, where, under his uncle, the celebrated Maurice (q.v.), he was initiated into the art of war. Returning to France in 1630, he was favourably received by Richelieu, who at once gave him a commission. During the alliance of France with the Protestants in the Thirty Years' War he fought with distinction (part of the time under Bernhard of Weimar), and helped to bring about the capture of Landrecies, Maubeuge, and Breisach. The victory of Casale in the Italian campaign of the following year added to his laurels, and in 1641 he was entrusted with the supreme command. The rapid conquest of Roussillon from the Spaniards in 1642 was rewarded in 1644 with the baton of a marshal of France and the chief command on the Rhine. Condé's arrival transferred him for a time to a subordinate position; and his restoration to supreme command was followed by the commission of a strategic error for which he was severely punished by the Imperialist general Count Mercy, who completely routed him at Marienthal, 5th May 1645; but on August 3 of the same year this disgrace was amply avenged by Condé at Nördlingen; and Turenne gloriously concluded France's share in the war by the reconquest of the Trèves electorate, by the conquest of Bavaria (1646–47) with the Swedes, and by a successful campaign in Flanders.

In the civil wars of the Fronde (q.v.) Turenne joined the party of the *frondeurs*, moved by his passion for the Duchess of Longueville; but after being defeated at Rethel (December 15, 1650) he withdrew to Flanders, returning on Mazarin's retirement. On the minister's return Turenne joined his party, while Condé deserted to the *frondeurs*, and the two greatest generals of the period were for the first time pitted against each other. Turenne triumphed over his former chief at Gien and the Faubourg St Antoine (1652), and ultimately forced him to retire from France; after which he subdued the revolted cities, crossed the northern frontier, and conquered much of the Spanish Netherlands. His defeat of Condé at

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the Dunes (1658), with the help of Cromwell's 6000, closed their long struggle. In 1660 Turenne was created Marshal-general of France, and in 1668 he became a Catholic from loyalty. His next campaign in Holland was triumphant (1672), and the year after he held his ground against both the Imperialist Montecuculi and the Elector of Brandenburg. In 1674 he dashed across the Rhine, defeated the Duke of Lorraine at Sinsheim, next mercilessly ravaged the Palatinate, crushed Brandenburg at Colmar, laid waste Alsace, and then advanced into the heart of Germany again to meet a worthy antagonist in Montecuculi. But their famous four months' passage of strategy was left unfinished, Turenne being killed by a cannon-ball while reconnoitring at Sasbach, 27th July 1675. His remains, entombed at Saint Denis, were respected at the Revolution, and were placed by Napoleon under the dome of the Invalides.

Turenne left *Mémoires* (published 1782); and there are Lives by Ramsay (Paris, 1733), Raguenet (1738), Duruy (5th ed. 1889), Hozier (Lond. 1885); and works on his strategy and tactics by Neuber (Vienna, 1869), Roy (Paris, 1884), and Choppin (Paris, 1875 and 1888).

Turf. See PEAT; for turf laws, HORSERACING.

Turfan, an important city in the east of Eastern Turkestan (part of which is sometimes named after it), on the southern slope of the Tian-shan Mountains and on a tributary of the Tarim River. Its once important trade fell off seriously in 1860–70 owing to the troubles in Kashgar. Pop. 30,000.

Turgenief, IVAN SERGEÏTCH (whose family name is represented by spellings as various as *Tourghénieff*, *Turgenjew*, *Turgenef*), one of the greatest of Russian novelists, and the first to make the life of Russia familiar to western Europe, was born the son of a noble and wealthy family at Orel, 9th November 1818, and educated at Moscow, St Petersburg, and Berlin. For about a year he held a post in a government office (1840–41), but retired voluntarily into private life, subsequently living on his estate in Orel, at St Petersburg, or abroad. He became known as a poet in 1843; but his *Annals of a Sportsman* (1846; trans. New York 1885) made him famous—especially for his singularly vivid pictures of the life of the serf and his powerful impeachment of the evils of serfdom. His outspoken liberalism in a *Letter on Gogol* (1852) led to a short imprisonment and his seclusion on his own estate till 1855. Thereafter he lived mainly in Baden-Baden (till 1871) and Paris—where he was a member of the most brilliant literary circles—with short summer visits to Russia. He died at Paris 3d September 1883; and his body was taken to Russia and buried at St Petersburg on the 9th October. A careful rather than a facile writer, Turgenief was a prolific author; though none of his novels is long (many of the most striking extend to only thirty or forty pages), and all are very slight in plot. In *Roudine* (1855; Eng. trans. 1883), *A Nest of Nobles* (1858; trans. by Ralston as *Lisa*, 1869), and *Helene* (1860; trans. as *On the Eve*, 1861) he depicts scenes and characters from the period of enthusiastic dreaming and theorising; in *Fathers and Sons* (1861; trans. 1867), *Smoke* (1867; badly trans. in 1868, better in 1872), and *Virgin Soil* (1876; trans. 1877, and another in 1878) he deals with the period of practical reform and the triumph of Slavophil ideas. But in the latter series he shows himself suspicious of a movement carried through on lines he, an admirer of the methods of western Europe, did not sympathise with, and he dwells too exclusively on the errors and extravagances of the new ideas, caricaturing Young Russia in a manner that gave much offence and led to the author's being regarded as reactionary. His freshness, noble realism, and poetic insight are somewhat impaired by increasing pessimism and hopelessness: the really good men are mostly fools, and progress leads but to evil continually. His accuracy of observation, variety of interests, and width of sympathy are everywhere visible; he is a master in the art of character-sketching; and his style is singularly finished and perfect. Even in France he was by many regarded as the greatest novelist of his time. He left several collections of epic and lyric poems and a series of dramas; and of his other tales—all on Russian themes—*First Love*, *Mumu*, *Annouchka*, *An Unfortunate Woman* have also been translated into English, some of them by American translators. In person Turgenief was exceptionally tall and strongly built, with a majestic bearing; his hair and full beard were in his later years silver-white. He was a magnificent talker in several tongues; some of his novels he wrote in French. He had read much English literature and paid several short visits to England.

See Henry James, *French Poets and Novelists* (1884) and *Partial Portraits* (1888); C. E. Turner, *The Modern Novelists of Russia* (1890); De Vogüé, *Le Roman Russe* (1888); Paul Bourget, *Psychologie Contemporaine* (1888); and German monographs on Turgenief by Zabel (1883) and Thorsch (1886).

Turgot, ANNE ROBERT JACQUES, an eminent French statesman, born at Paris, May 10, 1727, was descended from one of the most ancient families of Normandy. His father held the highest municipal offices at Paris. In his boyhood Turgot was shy, over-sensitive, and awkward; and these failings were aggravated by the harshness of his mother. Being a younger son, he was educated for the church; but soon after attaining to manhood he resolved to abandon the ecclesiastical for the legal profession; 'he could not consent,' he said, 'to wear a mask all his life.' At an early age he had joined the ranks of the philosophic party, who were rapidly imbuing the opinion of France and of Europe with new ideas. Even before he left the Sorbonne, where he had a distinguished career, he wrote essays which gave him a place among the most enlightened students of history of his time. After holding some legal appointments of subordinate importance Turgot was appointed to the office of Intendant of Limoges in 1761. Though more than once invited to more attractive positions, he filled the post for thirteen years, eagerly and resolutely striving to apply to his province the principles of justice and progress, which he loved. The Limoges was in a very low condition when he entered on his functions. In many ways it was merely a sample of the prevalent state of things all over France before the Revolution; in some respects it was worse than other districts. The soil was not fertile, and the natural defects of the soil were made unspeakably worse by a system of government which was irrational and unjust to a degrée almost inconceivable. The people were poor, rude, immoral, and superstitious, the victims from time immemorial of ignorance, degradation, and oppression. Turgot introduced a better administration of imposts, and succeeded in abolishing the method of repairing roads and bridges by compulsory labour. He introduced the cultivation of the potato into the Limoges, overcoming the prejudices of the inhabitants by using it at his own table. In 1770 he had to meet a famine, which lasted two years and reduced the people to the severest straits. It should be said that the central government, of which Turgot was the representative, readily supported him in his schemes as far as it was able; and he also received cordial assistance from the rural priests in reaching the minds of the people. The evils with which he had to contend were rooted in

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the social and political system of France, especially in the overgrown privileged classes, which, as intendant, he was powerless really to change.

On the accession of Louis XVI. in 1774 Turgot had a brief opportunity of attempting the regeneration of France on a wider scale. He was first appointed minister of Marine, and soon afterwards controller-general of Finance, at that period the most important department of government. His rise was hailed with joy by his friends Voltaire, Condorcet, and other chiefs of the school of progress; it was fervently hoped that by a philosopher in power great things would be accomplished. In his letter to the young king he adopted as the principles of his administration that there should be 'no bankruptcy, no augmentation of imposts, no loans;' and he at once entered upon a comprehensive scheme of reform. He reduced the expenditure, augmented the public revenue without imposing new taxes, and introduced exactness of payments and fidelity to engagements into all his financial operations. He sought to break down that immunity from taxation which had been enjoyed by the privileged classes, and so effect a better distribution of the burdens of government. He established free trade in grain throughout the interior of the kingdom of France, and in every way sought to remove the fiscal barriers which prevented free intercourse between the various provinces of the country. He also issued an edict to abolish the exclusive privileges of the *jurandes* or trade corporations, maintaining that the free right of labour was the first and most sacred right of humanity. It need not be said that these efforts towards a more economical, efficient, and equitable administration brought him into antagonism with all the privileged orders of France. Courtiers, nobles, prelates, farmers of revenue, financiers, and the members of the trade corporations alike saw their selfish interests menaced by the innovations of the new minister, and they combined for his overthrow. Louis XVI. was too weak to resist such pressure. He had not been in full sympathy with the philosophic minister. He complained that his controller-general never went to mass. Turgot was too austere, reserved, and perhaps also too inflexible and doctrinaire; and it was certainly a tactical mistake to unite against himself so many enemies. He attempted too many reforms during the short time he was in power. It may be that he lectured the king too severely on his duty as ruler. Yet Louis greatly esteemed his minister. He had once sadly observed, 'It is only M. Turgot and I who love the people.' The end was that Turgot was dismissed after holding office for twenty months, and France drifted rapidly into the great catastrophe of 1789. He retired quietly into private life, where he occupied himself with literature and science till his death from gout, March 8, 1781.

The efforts of Turgot towards a reform of the French political system have a profound and pathetic significance. By reason of his integrity, zeal for the public good, and administrative intelligence, Turgot was the best man to undertake the regeneration of France. 'He has,' Malesherbes said, 'the head of Bacon and the heart of L'Hôpital.' In practical affairs he was the fittest and most capable representative of the new ideas; and it was natural that Voltaire and other chiefs of the new school should lament his failure as a misfortune that touched them most nearly. It really meant that the hope of a reasonable and temperate change had passed away, through the weakness of the king and the folly and selfishness of the privileged classes. 'The part of the sages was played out; room was now for the men of destiny.'

Turgot's most important work was his *Réflexions sur la Formation et la Distribution des Richesses* (1766). It is the highest development of the Physiocratic school, with its excellences and also some of its characteristic errors, as that agriculture is alone productive, and that there should be only one tax, that on land; and it largely anticipates the teaching of Adam Smith. See POLITICAL ECONOMY.

See Condorcet, *Vie de Turgot* (1786); Lavergne, *Les Économistes Français au Dix-huitième Siècle* (1870); Neymarck, *Turgot et ses Doctrines* (1885); John Morley, *Critical Miscellanies*, vol. ii.; Léon Say, *Turgot* (trans. by G. Masson, 1888); *Correspondance inédite de Condorcet et de Turgot* (1770–79; edited by Henry, 1892).

Turin (anc. *Augusta Taurinorum;* Ital. *Torino*), a city of Northern Italy, formerly capital of Piedmont, and for a time of the kingdom of Italy, is situated in a beautiful plain bounded by mountains, near the confluence of the Po and the Dora Riparia, 54 miles from the Cenis tunnel by rail, and 80 miles NW. of Genoa. It stands at the meeting-point of several great roads through the Alps, and strategically has been of great importance. Really a very ancient city, it has a very modern appearance: ancient moats and fortifications have been removed, and the place is famed for its handsome streets, squares, and gardens. Some of the finest are Piazza San Carlo, Piazza Castello, Piazza Vittorio Emanuele (perhaps the finest square in Europe for size, regularity of architecture, and beauty of situation), Piazza Carlo Felice, &c. Among the numerous churches the principal are the cathedral of San Giovanni, originally built in the 7th century, and reconstructed as a cruciform Renaissance church in 1498; San Filippo, the finest church in Turin; La Consolata, containing several striking statues and a wonder-working Madonna; La Gran Madre di Dio; and a Waldensian temple. On the summit of a hill near the town is La Superga, a splendid Basilica, raised by Victor Amadeus to fulfil a vow, and now the mausoleum of the House of Savoy; its terrace, reached by a cable-railway, is a favourite resort for the enjoyment of a glorious view. Among the 'palaces' must be noticed the royal palace, designed by Castellamonte, rather poor in outward appearance; the Carignano Palace, an odd building, by Guarini; the town-hall, designed by Lanfranchi; the university, with 210 professors and lecturers and over 2000 students, a library of 225,000 volumes and 2000 MSS.; the Accademia delle Scienze (once the Jesuit college), by Guarini; the Seminary; the Hospital of San Giovanni. There are of course innumerable schools or seminaries, military and technical colleges, and museums. The private palaces are numerous and vast, but not in a noble style of architecture. The number of statues is exceptionally great, and many of them are fine. Among famous natives were Gioberti, Cesare Balbo, Cavour, Marochetti, D'Azeglio, and the French mathematician Lagrange. The manufactures of Turin consist of cotton, woollen, and silk fabrics, carpets, velvet hats, paper, iron, pottery, leather, gloves, bijouterie, furniture, wax matches, tobacco, and liqueurs. Pop. (1700) 40,000; (1800) 42,000; (1881) 233,134; (1890) 230,183. Turin was originally inhabited by the Taurini, a tribe of Ligurians. It is first mentioned in history in the time of Hannibal, by whom it was taken and sacked on his descent into Italy. Turin became a Roman colony under Augustus. On the fall of the empire it passed to the Lombards, and became the capital of one of the thirty Lombard duchies. Charlemagne made it the residence of the Duke of Susa, whose line ruled till 1060, when the House of Savoy succeeded it. The place acquired importance when Amadeus V. made it his capital and residence, and built a castle. It was taken by the French in 1506, and

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held by them for nearly sixty years. They again took it in 1640; and in 1796 it was dismantled, and in 1800 united to the French Republic with the name of the department of the Po. In 1815 restored to the House of Savoy, it was the capital of Sardinia till 1860, and from 1860 to 1865 the capital of the kingdom of Italy. See works by Cibrario (1847), Promis (1869), and Borbonese (1884).

Turkestan, 'the country of the Turks,' called by the Persians *Turan* (see TURANIAN), is an extensive region of central Asia, stretching from the Caspian Sea eastward to beyond Lob-nor (110° E. long.), and from Siberia and Dzungaria southward to Persia, Afghanistan, and Tibet. Until recently it was supposed that the Bolor Tagh, a mountain-chain of the first magnitude, running north and south, divided it into two parts. English explorers entering Turkestan from the south, and Russians from the north, have shown that no such range exists. Its place is taken so far, however, by a lofty tableland, the Pamir (q.v.), which separates the rivers running eastward to the desert of Gobi from those which run to the Sea of Aral, and divides Turkestan into a western and an eastern portion.

WESTERN TURKESTAN, or simply Turkestan, consists of the great hollow plain of the Caspian and Aral Seas, which occupies its west and centre, and of the hilly and well-watered districts formed by the ramifications of the Tian-shan Mountains and Hindu Kush. The plain is composed of deserts of loose shifting sand, interspersed with oases where a subsoil of clay renders the formation of lakelets of rain possible; strips of fertile land along the banks of rivers, and occasional tracts clad with coarse thin grass; the eastern districts abound in valleys of remarkable fertility. The climate varies on the plains from extreme cold to burning heat; in the eastern highlands, although the cold is almost as intense in winter, the heat of summer is much less. The rivers of Turkestan are the Syr-Daria (see JAXARTES) and Amu-Daria (see OXUS); the Zarafshan, which rises on the south of the Asfera-tagh, and flows westward for 400 miles, terminating in a small salt lake or marsh near Bokhara; and the Murghab, which rises in the mountains of Ghur, and, after a west-north-west course of 450 miles, loses itself in a marsh beyond Merv. The vegetable products of the country are fruits, grain, cotton, flax, hemp, and tobacco. Silk is also produced in considerable amount. Coal has been recently discovered in Ferghana, and salt is abundant, large tracts of desert being strongly impregnated and even crusted over with it; and sal ammoniac is common. Agriculture and the breeding of the domestic animals are the occupations of the great mass of the population; but manufacturing industry is also considerable, the produce consisting of cotton, silk, linen, and woollen goods, shagreen (superior to that manufactured in Europe) and other kinds of leather, paper made of raw silk, carpets, and a few sabres, knives, and rifles.

Western Turkestan is divided into Russian Turkestan, including Khokand, now Ferghana, in the north and north-east, and the Tekke Turkoman country, with Merv, in the south-west; Khiva, under Russian influence, in the west; Bokhara, in the east and centre; and Afghan Turkestan, including Badakshan and Kunduz, Balkh, Maimaneh, Andkhui, and Sir-i-pul. The population comprises Uzbegs, the dominant race, Turkomans, Karakalpaks, Kirghiz, Sarts, Tajiks, Persians, Kiptchaks, and a few Arabs, Hindus, and Jews. Of these the Sarts and Tajiks, the original inhabitants of the cities, are of ancient Persian stock, and along with the Uzbegs, Hindus, and Jews form the settled population; the Persians are mostly descendants of slaves; the other races are largely nomad and predatory. For the ethnographic relations of the Turkomans, see TURKS. The prevalent religion is Mohammedanism, and most of the tribes are Sunnites; a few Shîites, Sûfîs, and Buddhists are also found. The number of inhabitants in Russian Turkestan amounts to 3,341,913, those of Khiva to 260,000, and of Bokhara to about 1,800,000. The area of Russian Turkestan is estimated at 410,000 sq. m., that of Khiva at 25,000 sq. m., and that of Bokhara at 90,000 sq. m. There are separate articles on the various countries and races.

Turkestan has played an important part in Asiatic history from the very earliest times. The contests between the Iranian and Turanian races occupy a prominent place in Firdausi's sketch of the semi-mythical traditions of Persia; and the earliest light of history shows us Bactriana (Balkh) and Sogdiana (Bokhara) as well cultivated and populous countries, generally attached to the Persian empire, and inhabited by Persians, to whom most of the prominent cities of Turkestan owe their origin. With Persia Turkestan passed into the hands of the Macedonians, who made Bactria an independent Greek kingdom, while the rest was in possession of the Parthians. Under the Sassanides the Persian boundary was again advanced to the Jaxartes; but the gradual gathering of Turkish tribes from the north-east on the right bank of that river led to a constant state of warfare on the frontier, which ultimately resulted in the occupation of *Mavera-ul-neher* ('the country between the rivers'—i.e. the Oxus and Jaxartes) and of Kharasm (Khiva) by the invaders. In the 8th century of the Christian era the Arabs possessed themselves of Turkestan, and during the decline of the califate it became the seat of various minor dynasties, as the Samani in Mavera-ul-neher, and the shahs of Kharasm. After a brief union with the Seljuk empire in Persia it was mostly united to Kharasm, and along with it overrun by the Mongol hordes under Genghis Khan (q.v.), on whose death it became one of the four divisions of his vast empire, and was allotted to his son Jagatai—after whom was named the Turkish dialect formerly spoken in Persia and all over the East. On the decline of Jagatai's dynasty Timûr (see TAMERLANE) rose to supreme authority in Turkestan, and in the course of a thirty-five years' reign made it the centre of an immense empire, which stretched from the Hellespont to the frontiers of China, and from Moscow to the Ganges. This period was the golden age of Turkestan; its powerful monarch was never weary of adorning its cities with the spoils of victory; colonies of learned men, skilled artisans, and all whose knowledge or abilities could be of service to his subjects, were either transferred to Turkestan from the countries he had conquered or induced by the most munificent offers to settle there; till under him and his more immediate successors Samarkand became a focus of enlightenment and learning. But after the death of Shah Rokh, Timûr's youngest son, the empire was split up into numerous fragments; and after a time a new dynasty snatched Persia from Timûr's family, while the Uzbegs, under Sheibanî Khan, drove them (1500) from the country north of the Amu-Daria; one of the expelled princes, Bâber Mirza, who had ruled in Ferghana (the south half of Khokand), subsequently founding the 'Great Mogul' empire in India. The Uzbeg empire generally included Badakhshan, Herat, and Meshed; but these were lost on its division, in 1658, into various independent khanates. Khiva was conquered by Nadir Shah in 1740, and Bokhara limited to the north bank of the Amu-Daria; but the Kirghiz of the Little Horde restored the independence of Khiva, which they ruled till 1792, when the

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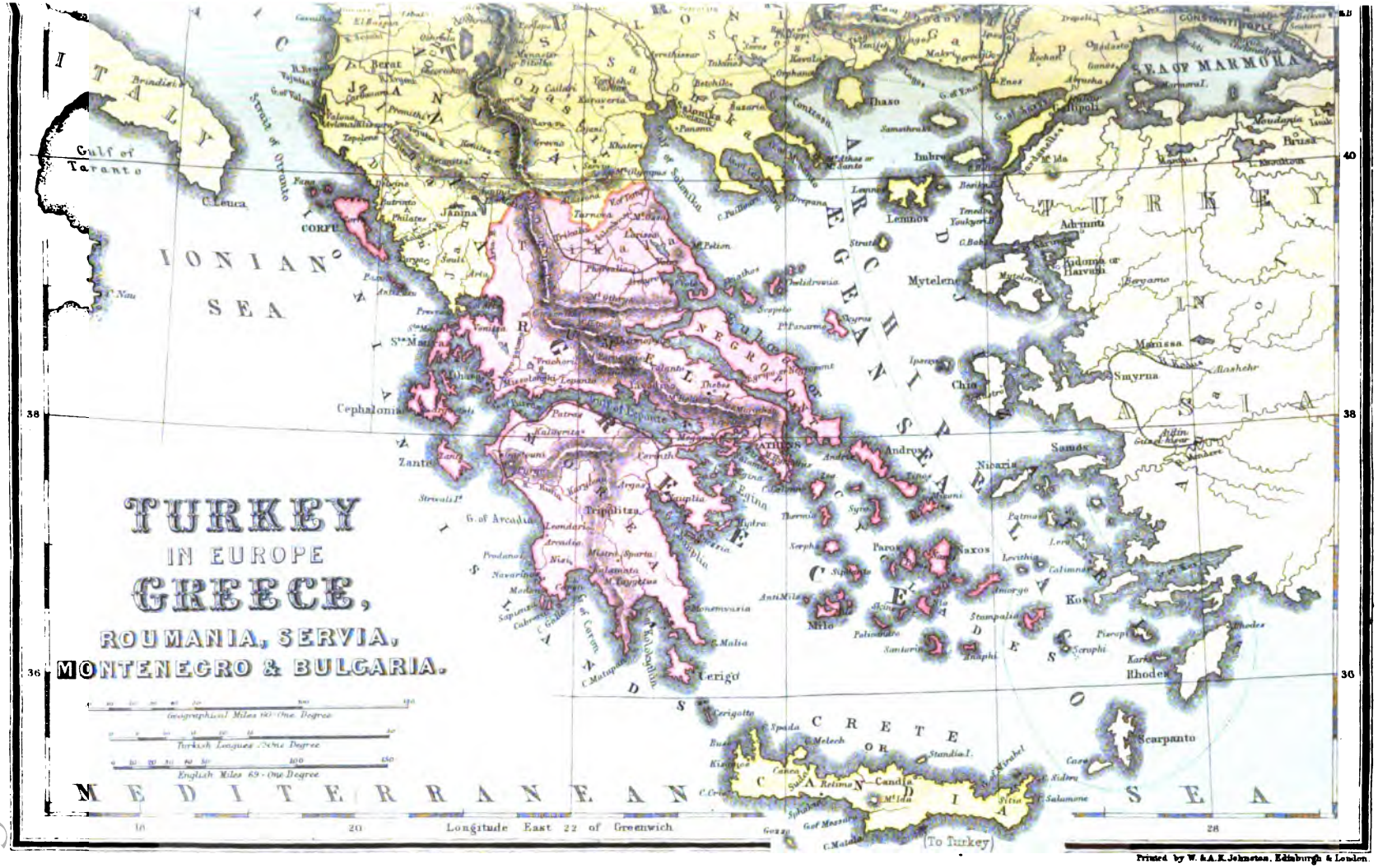

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present Uzbeg dynasty obtained the throne; and Shah Murad (1806-22) effectually gave back its former extensive sway to the Bokhariot sceptre. Khokand, after emancipating itself from the authority of Sheibani's successors, was incorporated with Bokhara, but afterwards united with the states of Eastern Turkestan. The recent history of Turkestan records a series of wars between Bokhara and Khokand, and Bokhara and Khiva, in which the Bokhariots had generally the advantage, owing to the aid of the Turkomans of the southern desert; the raids of the Turkomans along the northern frontier of Persia; the advance of the Afghans from the south-east; and the progress of Russian conquest from the north and west. Between the deserts of Turkestan and those of Persia lies a long and fertile tract running from the south-east of the Caspian to Herat, the 'key to India;' over it pass the great routes from western to eastern Asia.

North of it, chiefly in the deserts, dwell the Turkomans, long notorious as brigands and manstealers, and till of late constantly engaged in marauding expeditions against the Northern Persians. The atrocities they committed far exceeded anything recorded of the African slave-trade. In 1860 the Persians marched against them, but were defeated in attempting to capture their entrenchments in a marsh, and 15,000 Persians and thirty guns were taken by the Turkomans. In 1865 a more successful expedition proceeded against Sarakhs. In 1849 the Afghans invaded the south-eastern part of Turkestan for the recovery of possessions they claimed north of the Hindu Kush. In 1850 they took Balkh and Khulm, and in 1859 Kunduz, Badakhshan at the same time submitting to pay a large tribute. Elsewhere the Russians bade fair soon to absorb all that remained of independent Turkestan; in 1864 they took Tashkend and Khokand. A struggle followed with Bokhara; on the 20th May 1866 was fought the important battle of Irjar, when the emir had to flee for his life. In 1868 the Russians, 8000 men, again advanced. The troops of the emir, 40,000 men, took to flight; and a treaty was concluded by which Bokhara transferred Samarkand to Russia. Early in 1873 an expedition was sent against Khiva, which fell in June of that year. A great part of Khivan territory north of the Amu-Daria was ceded to the conquerors; and after a fierce struggle in 1875 and 1876 with the warlike inhabitants of Khokand, Russia formally annexed the whole. In 1879 the Russians unsuccessfully attacked the Akhal Tekke Turkomans living on the southern edge of the Kara Kum desert, between the Caspian and Merv; but in 1880-81, under Skobeleff, they completely subjected the Tekkes, and Merv became Russian. In 1885 a long talked of commission, English and Russian, was appointed to delimit the frontier in dispute between Afghanistan and Turkestan, now Russian, especially in the steppe region between Merv and Herat; the Oxus being accepted as frontier farther east. After the English Commission was on the ground very serious diplomatic difficulties arose, threatening to issue in war between England and Russia, and a battle took place between Russians and the Afghans at Penjdeh. Ultimately a frontier line was agreed on, which left Penjdeh and Pul-i-Khatun to Russia, and Maruchak and Zulfikar to Afghanistan (q.v.). *Russian Turkestan* had in 1885 an area of over 410,000 sq. m. and a population of near 3,250,000, being divided into the provinces of Zarafshan, Semiretchinsk, Syr-Daria, Russian Kuldja, Amu-Daria, Ferghana. A railway 900 miles long, from Uzun-Ada on the eastern shore of the Caspian Sea to Samarkand, connects this outlying province of Russia with the mother-country, and has wrought a great change in the economical conditions of Turkestan.

See the present writer's *Bokhara* (1873); Schuyler's *Turkestan* (1877); Marvin's *Merv, Queen of the World* (1881); O'Donovan's *Merv Oasis* (1882); and a copious literature in the magazines and reviews.

EASTERN TURKESTAN, known formerly as *Chinese Turkestan*, *Little Bukharia*, and *Túrfan*, is bounded on the N. by the Tian-shan Mountains, on the W. by the Pamir tableland, and on the S. by the highlands of Tibet or Cashmere. Towards the east it sinks to the desert plain of the Gobi, round the western bay of which it forms a vast crescent-shaped oasis from 4000 to 5000 feet in elevation, drained by the tributaries of the Tarim. This river flows eastward into the desert and empties itself in the Lob-nor, after a course of 1500 miles. The Lob-nor, a lake or rather series of lakes and marshes, was first visited by Colonel Prejevalsky in 1877. The region around it is very desolate and unattractive. Canals ramify the country, sometimes crossing one another at three levels. But large areas are very unproductive; and though there are numerous villages and towns, some of them large, the population of the country as a whole—probably some 600,000—is but thin. The country produces gold and abundance of silk; and the inhabitants are skilful in making gold and silver stuffs, carpets, and linen, cotton, and silk goods. The political capital is Kashgar, the seat of a Russian consul; the commercial capital, Yarkand. Kuldja, taken by the Russians from the rebels against Chinese authority in 1871, was retained by Russia in spite of Chinese protests. In 1881, however, Chinese persistence carried the point, and Kuldja was restored to China. Since the re-conquest of the country by China anarchy has given way to public security, and trade is now flourishing. The inhabitants speak Turkish, but there are also Tajiks of Persian descent. Little is known of Eastern Turkestan previous to its conquest by Genghis Khan; but after the decay of his empire into petty states, among which are Kashgar, Yarkand, Aksu, and Khoten, the chiefs of these were constantly quarrelling with each other, till several of the leaders, with the Yarkand prince at their head, invited the Chinese to take possession of the country, and in 1758 it became a province of China. In 1864, however, a mutiny among the Chinese troops induced the dispossessed native chiefs to stir up a Mohammedan insurrection. They invited a Khokand prince, Buzurg Khan, to assume the government; and he, through his lieutenant Yakoob Beg, dispersed the Chinese garrison. But the lieutenant soon superseded him, and became sole Emir under the title of Atalik Ghazi. He possessed civil as well as military capacity, and raised the country to a state of considerable prosperity. From 1869 he successfully resisted the encroachments of Russia, but in 1876 the Chinese again advanced, defeated him, and retook their old province in 1877.

See Forsyth's *Report* (1875); *From Kulja, across the Tian Shan to Lob-Nor*, by Colonel N. Prejevalsky (1879); Boulger's *Life of Yakoob Beg* (1878); and the reports given by Ney Elias, Carey, and Younghusband.

Turkey, or the OTTOMAN EMPIRE, comprises the wide but heterogeneous territories really or nominally subject to the Osmânlî sultan, in Europe, Asia, and Africa. These territories, which once extended from the Danube to the Cataracts of the Nile, and from the Euphrates to the borders of Morocco, have been considerably reduced in the 19th century by the aggression of France in Algiers and Tunis, by the influence of England in making Egypt practically independent of its titular sovereign the sultan, and by the treaty arrangements which followed the Russo-Turkish war of 1877. Algiers has belonged to

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France since 1830; Tunis has been practically a French province since 1881; Egypt, though still tributary to 'the Porte' or Turkish government, has since 1882 been in no danger of ever reverting to its former condition of a Turkish province; whilst by the decisions of the Berlin Congress of 1878 the tributary states of Roumania and Servia became independent kingdoms, and obtained an increase of territory in the Dobrudja and about the Morava respectively; the independence of Montenegro was recognised, and its borders enlarged to include Dulcigno and Antivari; Austria-Hungary took Bosnia and Herzegovina under its protection; Greece was to push her frontier northward and absorb Thessaly (q.v.); and in the very heart of European Turkey Bulgaria was cut off and created a tributary principality, to which Eastern Roumelia was added in 1885, under the guaranty of the Great Powers. The result of these limitations is that Turkey in Europe consists merely of a strip of territory south of the Balkans, stretching across from the Black Sea to the Adriatic, and including ancient Thrace, Macedon, Epirus, and Illyria; Turkey in Africa is practically reduced to the regency of Tripoli; while Turkey in Asia still spreads from the Euxine to the Red Sea and Persian Gulf, intact, save for the cession of Kars and Batoum to Russia after the war in 1877, and the transference of the administration of Cyprus to England. The area and population of the Turkish empire may be approximately tabulated as follows; it being premised that statistics in Turkey are not precise:

	Sq. Miles.	Pop.
IMMEDIATE POSSESSIONS—		
In Europe	65,000	4,500,000
In Asia	730,000	16,000,000
In Africa (Tripoli)	400,000	1,000,000
	1,195,000	21,500,000
TRIBUTARY STATES—		
Bulgaria and Eastern Roumelia	38,000	3,000,000
Bosnia and Herzegovina (under Austria)	24,000	1,500,000
Cyprus (under England)	3,700	210,000
Egypt	400,000	6,900,000
	465,700	11,610,000
Total	1,660,700	33,110,000

A Turkish census was begun in 1885, but the returns are not complete. It would appear, however, that the six vilâyets or provinces which, with the city of Constantinople, form European Turkey mustered the following population: Constantinople, 873,565; Adrianople, 776,603; Salonica, 966,308; Monastir, 497,930; Janina, 513,216; Scutari (Albania), 102,819; Kossovo, 561,282; total, 4,293,723, of which 2,329,000 were males. The most populous vilâyets of Asiatic Turkey are those of Smyrna (Aidîn) and Trebizond, each with over a million inhabitants. Of cities in European Turkey Adrianople has 100,000 inhabitants, and Salonica 60,000; whilst in Asia Damascus has 200,000, Baghdad 180,000, and Aleppo 120,000.

Turkey in Europe, generally undulating, is traversed by a mountain-system which has its origin in the Alps, enters Turkey at the north-west corner, and runs nearly parallel to the coast, under the names of the Dinaric Alps and Mount Pindus, as far as the Greek frontier. This range sends numerous offshoots east and west; the great eastern offshoot being the Balkan (q.v.) range, with its numerous branches to north and south. The Balkans are no longer included in Turkey proper, and the highest peaks of modern European Turkey are now in the Despoto Dagh or Rhodope range (7474 feet) and the Skar Dagh (10,000 feet) on the Albanian frontier. The rivers of Turkey are chiefly, to the north of the Balkans, the Morava and numerous other tributaries of the Danube; and to the south, the Maritza, Karasu, Struma, and Vardar, which flow into the Ægean, and drain Roumelia (Macedon and Thrace); the Narenta, Drin, and Voyutza fall into the Adriatic. On the high lands the cold is excessive in winter, owing to the north-east winds which blow from the bleak and icy steppes of southern Russia; and the heat of summer is almost insupportable in the western valleys. Violent climatic change is, on the whole, the rule in European Turkey; but those districts which are sheltered from the cold winds, as the Albanian valleys and parts of Roumelia, enjoy a comparatively equable temperature. The soil is for the most part very fertile; but owing to oppressive taxation little progress has been made in the art of agriculture, and the most primitive implements are in common use. The cultivated products include most of those usual in central and southern Europe—maize, rice, rye, barley, millet, besides tobacco, madder, and cotton. The mineral products are iron in abundance, argentiferous lead ore, copper, sulphur, salt, alum, and a little gold; some deposits of coal have been found, but none are worked. Sheep-breeding is largely carried on. The wild animals are the wild boar, bear, wolf, wild dog, civet, chamois, wild ox, and those others which are generally distributed in Europe. The lion formerly roamed the Thessalian mountains.

Turkey in Asia is still more mountainous. The two almost parallel ranges, Taurus and Anti-Taurus, which are the basis of its mountain-system, cover almost the whole of the peninsula of Asia Minor (q.v.) or Anatolia with their ramifications and offshoots, forming the surface into elevated plateaus, deep valleys, and enclosed plains. From the Taurus chain the Lebanon range proceeds southwards parallel to the coast of Syria, and, diminishing in elevation in Palestine, terminates on the Red Sea coast at Sinai. The Euphrates, Tigris, Orontes, and Kizil-Ermak are the chief rivers. On the whole, Turkey in Asia is ill supplied with water; and though the mountain-slopes afford abundance of excellent pasture, the plains, and many of the valleys, especially those of the Euphrates, Tigris, and Jordan, are reduced by the parching droughts of summer to the condition of sandy deserts. In ancient times these now desert districts were preserved in a state of fertility by artificial irrigation; but during the six centuries of almost constant war which convulsed this once fair region the canals were neglected, and have, ever since the rise of the Osmânlî power, remained in an unserviceable condition. Nevertheless the fertile portions produce abundance of wheat, barley, rice, maize, tobacco, hemp, flax, and cotton; the cedar, cypress, and evergreen oak flourish on the mountain-slopes, the sycamore and mulberry on the lower hills, and the olive, fig, citron, orange, pomegranate, and vine on the low lands. The mineral products are iron, copper, lead, alum, silver, rock-salt, coal (in Syria), and limestone. The fauna includes the lion (east of the Euphrates), the hyæna, lynx, panther, leopard, buffalo, wild boar, wild ass, bear, wolf, jackal, jerboa, &c.; and the camel and dromedary must be added to the ordinary list of domestic animals.

Turkey in Africa is described at TRIPOLI, TUNIS, and EGYPT, of which the first alone can properly be termed a direct Turkish possession.

Industry, Manufactures, and Trade.—Notwithstanding the primitive state of agriculture in Turkey, the extreme fertility of the soil makes ample amends for this defect. The exports include cereals, tobacco, raisins, dried figs, olive-oil, silk, wool, mohair, red cloth, dressed goat-skins, excellent morocco, saddlery, swords of superior quality, shawls, carpets, dyestuffs, embroidery, essential oils, attar of roses, opium, plum-brandy, meerschaum clay, honey, sponges, drugs, madder, gall-

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nuts, various gums and resins, and excellent wines. The imports are manufactured goods of all kinds, glass, pottery, arms, paper, cutlery, steel, amber, and especially cotton goods. In 1889–90 the total value of exports was £13,486,600, and of imports £18,704,570; of which Great Britain purchases about 38 per cent., and exports to Turkey 43 per cent. The countries trading with Turkey are, in order of importance, Great Britain, France, Austria, Russia, Italy, Greece, Persia, &c.; and the principal ports are Constantinople, Trebizond, and Smyrna. The mercantile marine is small. In 1885 it comprised only some 300 sea-going ships, of 65,000 tons; but there were in 1892 two commercial steamship companies, with a fleet of 39 vessels. There are 530 miles of railway open in European Turkey, and in Asiatic Turkey 390.

Races.—The population consists of a singular mixture of races. Turks, Greeks, Slavs, and Albanians are largely represented, besides Armenians, Jews, Circassians, and Frank residents. In European Turkey the Turks are about 2,000,000, the Greeks and Bulgarians 1,300,000, the Albanians 1,500,000. In Asia the Turks are about 7,000,000, the Kurds 1,000,000, the Greeks 1,000,000, the Armenians over 2,000,000; while the rest is made up of Syrians, Arabs, Jews, Druses, Franks, Gypsies, Tartars, Circassians, &c. Of these the Greeks and Armenians are principally traders; the Turks, Slavs, and Albanians are the chief agriculturists in Europe, and the Turks, Armenians, and Syrians in Asia. Of the 15,000,000 Mohammedans, 12,000,000 are in Asiatic Turkey.

Administration, Religion, and Education.—The government of Turkey has always been a pure despotism; for the constitution promulgated in 1876 and revoked in 1878 was merely nominal. The sultan (also called Pâdishâh, Grand Signior, Khân, Hunkiâr) is represented in all matters spiritual by the Grand Mufti or Sheykh-el-Islâm, who enjoys considerable influence as head of the Ulema (q.v.), and in temporal affairs by the Grand Vezîr (or Sadr-A'zam), under whom are the members of the cabinet or divan, including the president of the council, the ministers of foreign affairs, of war, of the navy, of artillery, of the interior, of justice, of finance, and the other heads of departments of the administration. Governmental crises are frequent, especially of late; and palace intrigues have always been a powerful factor in Turkish politics. The governors of the *vilâyets*, or provinces, who are appointed by the sultan, are styled *vâlis*; each vilâyet is divided into *sanjaks*, or *livas*, ruled by inferior officers; and each liva is subdivided into districts and communes. The provincial governors have no longer the power of life and death; and their freedom to practise extortion on those under their rule has been greatly restricted; but so long as they are ill-paid and hold a precarious tenure of an expensive office their administration is sure to remain venal and corrupt. The established religion is Islâm or Mohammedanism, but most other creeds are recognised and tolerated; and since 1844, thanks to the strenuous efforts of Lord Stratford de Redcliffe (q.v.), a Mohammedan has been free to change his religion without becoming liable, as before, to capital punishment. The Protestant religion was for the first time officially recognised in Turkey in 1845. Education was long neglected, but in 1847 a new system was introduced, and since then schools for elementary instruction have been established throughout Turkey, and middle schools for higher education, and colleges for the teaching of medicine, agriculture, naval and military science, &c.; whilst among the Christians education has notably improved. Many wealthy Turks send their sons to France or Britain to be educated, with somewhat doubtful results.

Revenue and Debt.—Long before the Russo-Turkish war of 1877 the Turkish exchequer was evidently on the brink of insolvency, as was manifested by the violent expedients proposed for escaping from part of its liabilities. In 1875 a decree reduced the interest payable on the debt to one-half; and by another decree in October 1876 the empire was declared bankrupt; but an unsatisfactory arrangement was come to with its creditors. The enormous expenditure of the war, and the loss of valuable provinces, added to the utter disorganisation of Turkish finances. In 1875–76 the revenue was estimated at £19,106,352, and the expenditure at £23,143,276. In 1878–79 the revenue was guessed at £14,000,000; expenditure (with part of the war expenses), £50,000,000. At the end of 1880 the *Times* reckoned the available annual revenue at £9,450,000, and the budget expenditure was nearly £12,000,000. In 1889–90 the revenue was estimated at £16,836,363, and the expenditure at £19,450,545. Between 1854 and 1874, when the borrowing power of Turkey came to an end, fourteen several loans had been contracted to meet deficiencies. At the end of that period the foreign debt of Turkey amounted to £184,981,783; but in 1882 it was reduced to £106,000,000. The Russians demanded £32,000,000 as war indemnity, to be paid off by yearly instalments of £318,180; of this about £1,500,000 had been paid up to October 1889.

Navy and Army.—The navy consists of fifteen armour-clad vessels, about forty smaller steamers, and twelve torpedo boats. In the course of the war with Russia Turkey contrived to put on a war footing no less than 752,000 men, including reserve and irregular troops. At the end of the war the disorganised remnant amounted to about 120,000 men. Extraordinary efforts have been made to keep up the army: in 1880, when it had seemed necessary to call out the reserves, the empire actually had an army of 300,000 men, well armed and fairly equipped. According to the reorganisation in progress at that time the military forces of the Ottoman empire consist of the active army (*nizam*), twelve army corps of landwehr (*redif*), and a landsturm (*mustafiz*). The first numbered in 1892 about 200,000, forming 278 battalions of infantry, 192 squadrons of cavalry, 159 field batteries, 30 mounted batteries, besides engineers and gunners at the forts. In case of war the total force of all arms could be raised to 750,000.

See works by Rev. H. F. Tozer (2 vols. 1869), Col. James Baker (1877), 'A Consul's Daughter' (1878), E. L. Clark (New York, 1883), Sutherland Menzies (3d ed. 1883), Rudler and Chisholm (1885), E. de Laveleye (Eng. trans. 1887), Lucy Garnett (1891-92), and D. Georgiades (*La Turquie actuelle*, 1892); also, for Asiatic Turkey, by Geary (1878), Davis (1879), W. M. Ramsay (1890), and Cuinet (Paris, 1891), and other works cited at SYRIA, BULGARIA, &c.

History.—The Osmânlîs or Ottoman Turks trace their descent from a small clan of the Oghuz, who were pressed forward from their old camping-ground in Khorâsân by the advance of the Mongols, and, coming to Armenia early in the 13th century, were fortunate enough to assist the Seljûk sultan of Iconium at a critical moment in his resistance to the Mongol avalanche, for which service they were rewarded with lands in Asia Minor. Ertughrul, the leader of the 400 horsemen who had thus come to the rescue of the Seljûks at the battle of Angora, was allowed to pasture his flocks and pitch his tents in the province anciently known as Phrygia Epictetus (now to be called Sultanöni), on the borders of the Byzantine province of Bithynia, and made the city of Sugut (Thebasion) his headquarters. Sugut was the birthplace of the Ottoman empire: thirty-five sultans have

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followed Ertughrul in the male line without a break, and, after six centuries, his descendant still stands lord over wide provinces and peoples of various races and languages. At Sugut in 1258 was born Osmân (or Othmân), from whom his followers took the name Osmânlîs, which Europeans have corrupted into Ottoman. At the beginning of the 14th century the Seljûk kingdom split up into ten states, one of which, the Ottoman province of Sultanöni, gradually absorbed the rest. Osmân, who reigned from 1301 to 1326, waged a guerilla war upon his Greek neighbours, and captured many fortresses, pushed his conquests to the verge of the Hellespont, and took Brûsa the capital of Bithynia. His son, Orkhân (1326–59), reduced Nicæa (1330) and absorbed one of the ten Seljûkian states, the ancient Mysia (1336). Thus in two generations the little clan of nomads had possessed themselves of the whole north-west corner of Asia Minor, and obtained the command of the eastern shores of the Bosporus and Propontis. Then for twenty years peace reigned between the Greeks and Ottomans, and Orkhân and his brother, 'Alâ-ed-dîn, devoted themselves to the task of organising the state, forming a standing army (the first in modern times) out of the material supplied by the mixed population of their dominions, and inaugurating the famous corps of Janizaries (*Yeni cheri*, 'new soldiery') which for centuries constituted the flower of the Ottoman army. This celebrated force was recruited entirely from Christian children, who were educated as Moslems, and carefully trained and disciplined. Deprived of all ties of kinship, but encouraged by every inducement to zeal and devotedness, this military brotherhood became the most devoted as well as the most fanatical instrument of imperial ambition which has ever been devised, until they abused their power so wantonly that they had to be summarily exterminated in 1826 by Mahmûd II. (see JANIZARIES). Besides this military organisation, the civil administration was skilfully ordered, and the government of the Turks contrasted favourably with the corrupt and nerveless rule of their Byzantine neighbours, who, for their part, humbled themselves by abject concessions, delivered up their imperial princesses to the harems of the Osmânlîs, and allowed them to levy blackmail in their raids for Christian slaves.

The Turks could not look across the Bosporus upon the domes of Constantinople without longing for its possession. In 1358 they occupied Gallipoli on the European side of the Dardanelles, and a few years later Adrianople and Philippopolis fell before the onslaught of the new sultan, Murâd I.—the first 'Amurath' of European writers (1359–89)—who in 1364 decisively routed the united Servians, Hungarians, and Vlachs, on the banks of the Maritza. In 1375 he took Nissa, the birthplace of Constantine, and received the homage of the despot of Servia and the kral of Bulgaria. The Balkan Peninsula was now a Turkish possession, with the exception of the territory immediately surrounding Constantinople. Twice again the Christians endeavoured to turn back the wave of Moslem conquest. Lazarus the Servian in 1389 led a great army against the Turks, but was severely defeated in the battle of Kosovo, which was, however, followed by the assassination of Murâd I. by the Servian Milosh Kobilovich. His successor, Bayezîd I. (Bajazet, 1389–1402), surnamed *Yilderim*, or 'Thunderbolt,' by reason of his impetuous valour, annexed the remainder of the Seljûkian states of Asia Minor, and meeting a vast army of the Christians of all Europe, who had vowed a crusade against the Turks in 1394, cut them to pieces at Nicopolis. Ten thousand prisoners were butchered in heaps before the eyes of the pitiless sultan from daybreak till four in the afternoon. The invasion of Timûr (Tamerlane) interrupted the victorious course of the Ottoman arms, then, apparently, on the eve of the capture of Constantinople. The Tartar hordes overran Asia Minor, and totally defeated near Angora, in 1402, the army which Bayezîd had vaingloriously brought into the field. The sultan was taken prisoner, and died in captivity eight months later. Timûr reinstated the Seljûk princes; the Christians of Europe were free; and the history of the Ottoman empire seemed to have suddenly come to an end. Its extraordinary revival was due partly to the physical and moral superiority of the Osmânlîs over their neighbours in Europe and Asia, partly to the enduring strength of their civil and military organisation, which contrasted strikingly with the demoralised condition of the Greek empire, and largely to the wisdom and prudence of Mohammed I., 'the Restorer,' also called *Chelebi*, or 'the Gentleman' (1402–13). By sound statesmanship, firm yet conciliatory, this able sovereign recovered all that had been lost in the Tartar convulsion. His foresight was displayed in an ominous step: he transferred the capital of his dominions from Asia to Europe, from Brûsa to Adrianople. The interval of prudent consolidation of the empire was followed by another period of aggression. His son and successor, Murâd II. (1421–51), was as wise as his father, but his lines were fallen in fighting times. A terrible foe had arisen in the person of Hunyady, the 'White Knight' of Wallachia (an illegitimate son of Sigismund, king of Hungary), who for twenty years was a cruel scourge of the Balkan provinces, and who inflicted grievous losses upon the Ottomans at Hermannstadt (1442), Vasag, and Nissa (1443). A ten years' peace was concluded by the treaty of Szegedin, by which Servia regained her independence and Wallachia was annexed to Hungary. Murâd was now weary of war and kingship, and abdicated in favour of his son Mohammed; whereupon the Christians, in violation of their oath and treaty, invaded the Ottoman dominions, led by Hunyady, and sanctioned by the presence of Frankish crusaders under the command of Cardinal Julian. This flagrant breach of faith drew Murâd from his voluntary retirement. He collected 40,000 veterans, induced the Genoese to ferry them across the Bosporus, and, displaying the violated treaty on a lance as his standard, fell upon the Christians at Varna (10th November 1444), and won a decisive victory. The king of Poland and the cardinal were among the slain. Henceforth, for more than two centuries, the Turks had nothing to fear from European invasions until the rise of the Russian power created a new danger.

Murâd's long reign of thirty years was soiled by no breath of dishonour; his character was as noble as it was commanding. His successor, Mohammed II., 'the Conqueror' (1451–81), reigned also thirty years, but his rule was marked by violence and treachery, and the new sultan was as cruel and unscrupulous as he was conspicuously able. The great event of his reign was the siege and capture of Constantinople (29th May 1453), whereby the miserable remnant of the Byzantine empire was extinguished for ever, and the Turks obtained that commanding position on the Bosporus which has contributed more than anything else, directly and indirectly, to the maintenance of their empire. In the north the progress of Ottoman conquest was arrested by the heroic defence of Belgrade in 1456 by Hunyady and John Capistran, and by the subsequent resistance of Hunyady's successor, Matthias Corvinus. In the west Scanderbeg for a while kept the Turks back in Albania. But towards the end of the reign they were making substantial progress. They had conquered the Crimea (1475), their arms

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were menacing Venice (1477), they had annexed Greece and most of the Ægean islands, made their first attempt upon the stronghold of the Knights of St John at Rhodes, and even planted their foot on Italian soil by the capture of Otranto in 1480. In the following year, whilst fitting out a vast expedition, Mohammed the Conqueror died, amid the thanksgivings of Europe. The long reign of his son, Bayezíd II. (1481–1512), was marked by no great conquests, and the chief interest centres in the adventures and fate of his unlucky brother, Prince Jem. With Bayezíd's son, Selîm I., 'the Grim' (1512–20), however, a new epoch of transcendent glory began to dawn. In his brief eight years of sovereignty he drove back Isma'îl, the powerful shah of Persia, after a furious battle at Chaldiran, and incorporated Kurdistân and Diârbekr in the Turkish empire, annexed Syria, and wrenched Egypt from the hands of the valiant Mamlûks (1517), who had possessed it almost since the days of Saladin. With Egypt came the Hijaz and its Holy Cities, while from the last 'Abbâsy Caliph of Cairo Selîm received relics of the Prophet Mohammed and the inheritance of the title of Caliph, by which his successors to the present day signify their claim to the homage of all orthodox Mohammedans. Selîm, however, did but usher in the great epoch (1520–66) of his son, Suleymân the Magnificent, though without the father's warlike genius it may well be doubted whether the son would have been able to attain to the glory with which his name is associated. His epoch is famous for many triumphs both by land and sea. He conquered Belgrade, and, after a heroic siege, reduced (1522) the rocky stronghold of the Knights of St John at Rhodes, who were allowed to evacuate the island upon honourable terms. In 1526 the sultan marched north, at the head of an army of 100,000 men and 300 guns, and utterly crushed the Hungarians on the field of Mohács, and slew their king, Louis II., and 20,000 of his followers. Buda and Pesth fell, and Hungary became an Ottoman province for a century and a half. Quarrels over the now nominal kingship of Hungary drew Suleymân northward again in 1529 to support his nominee, Zápolya, and after enforcing his authority, and laying the country waste, the sultan proceeded to push forward to Vienna. Austria was incapable of meeting him in the field, but Vienna heroically withstood a furious siege for eighteen days. The Turks abandoned their design for the moment, and the sultan retreated in disgust to Constantinople, and eventually made a truce with Charles V. in 1533. Eight years later, however, Suleymân led his ninth campaign in the north, and compelled the emperor to sue for peace, the Archduke Ferdinand agreeing to pay a heavy tribute to his lord the sultan, who retained the whole of Hungary and Transylvania. War and sieges, however, continued to the death of Suleymân in 1566. The sultan's claim to be called 'the Great' rests not merely upon his undoubted wisdom and ability, and the splendid series of his successes, but upon the fact that he maintained and improved his grand position in an age of surpassing greatness—the age of Charles V., Francis I., Elizabeth, and Leo X.; of Columbus, Cortes, and Raleigh. In the great days of Charles he dared to annex Hungary and lay siege to Vienna; and in the epoch of great navies and admirals, of Doria and Drake, he swept the seas to the coasts of Spain, and his admirals Barbarossa, Pialé, and Dragut created panic fear along all the shores of the Mediterranean, drove the Spaniard out of the Barbary States, and defeated pope, emperor, and doge together at the great sea-fight off Prevesa in 1538. But just as Vienna had resisted him in 1529, so the Knights of Malta withstood a powerful Ottoman armament in 1565, and 25,000 Turks fell in the fruitless siege.

Selîm II. (1566–74), a degraded sot, owed whatever renown belongs to his reign to the ability of his father's old statesmen and generals. Sinân Pasha subdued Arabia in 1570, and Cyprus was conquered in 1571; but these successes were outweighed by the utter defeat of the Turkish fleet by Don John of Austria, 7th October 1571, off Lepanto, which first broke the spell of Turkish prestige at sea. During this reign occurred the first collision of the Turks with the Russians. The connection of the Don and Volga by a canal was a project which, by allowing the passage of ships from the Black Sea into the Caspian, would obviously serve both military and commercial purposes; and accordingly 5000 workmen were despatched to cut the canal, and an army of 80,000 men to aid and protect them. The possession of Astrakhan formed part of the programme; but the attack upon this town brought upon the Turks the vengeance of the Russians, a people till then unknown in southern Europe; three-fourths of the Turkish army was lost in the expedition, and the project was abandoned. On the other hand, Tunis was taken from the Spaniards in 1574. The reign of Selîm's son, Murâd III. (1574–95), is chiefly notable for the reception of the first English embassy to Turkey in 1589, which was sent with the object of concluding an alliance against Philip II. of Spain. War with Persia ended in the extension of the Turkish frontier, so as to include Georgia, and a fresh contest with Austria was marked at first by success, but afterwards by severe reverses, until in the reign of the next sultan, Mohammed III. (1595–1603), the tide of failure was turned by a signal victory over the Austrians and Transylvanians on the plain of the Keresztes (1596). The victory, however, was not followed up; and the prestige of the Ottoman arms continued to wane. The Turks were no longer the terror of Europe. Of the next four sultans, Ahmed I. (1603–17), Mustafa I. (1617–18, 1622–23), Osmân II. (1618–22), and Murâd IV. (1623–40), the last alone resembled his great forefathers, and by his campaign against Persia and conquest of Baghdâd (1638) vindicated his title to be the last of the fighting sultans of Turkey. The death of Murâd IV. was the signal for fresh troubles. Mustafa, the grand vezîr (vizier), a man of great ability and integrity, indeed, continued to direct the helm of government under Ibrahîm (1640–48), took from the Poles their conquests, and in a war with the Venetians (1645) obtained Candia and almost all the Venetian strongholds in the Ægean Sea, though with the loss of some towns in Dalmatia. But the empire was distracted by military factions and seraglio intrigues, and the new sultan, Mohammed IV. (1648–87), began his reign under the most unfavourable auspices. He was only seven years of age, and the whole power was vested in the Janizaries and their partisans, who used it to accomplish their own ends. Fortunately for Turkey, in 1656 Mohammed Köprili, an old Albanian of seventy, but possessed of an iron will, was appointed vezîr with practically absolute powers; and the extraordinary talents of this man proved to be the salvation of Turkey at this critical juncture. He had 36,000 persons executed in his five years of office, and then died with a good conscience. He was succeeded (1661) in office by his son, Köprili-zâda Ahmed, a man of even greater ability, and under his guidance the central administration recovered its control over even the most distant provinces; a formidable war with Austria, though unsuccessful and marked by a severe defeat at St Gothard on the Raab (1664), was concluded by a peace advantageous to the Turks; Crete

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was finally subdued, and Podolia defended from the Poles; though these advantages were somewhat overshadowed by the crushing defeats administered at Choczim and Lemberg in 1673 and 1675 by John Sobieski (q.v.). The next vezîr, Kara Mustafa, who was not a Köprili, relied too much upon the success of his predecessors. He invaded Austria at the head of 400,000 men in 1682, and, undeterred by the great Suleymân's discomfiture, had the audacity to lay siege to Vienna. But the second siege ended even more disastrously than the first. The grand vezîr's army was totally routed by Duke Charles of Lorraine and John Sobieski, king of Poland. The Austrians followed up this victory by repossessing themselves of Hungary (1686), inflicting upon the Turks a bloody defeat at Mohácz, whilst Louis of Baden entered Bosnia, and the Venetians seized the opportunity to conquer the Peloponnesus and bombard the Acropolis of Athens. The fortunate appointment of a third Köprili, Mustafa, as grand vezîr by Suleymân II. (1687-91), was the means of restoring to some extent the faded honour of the Turkish arms; but with his death (1691) fortune deserted the Turks. Meanwhile Sultans Ahmed II. (1691-95) and Mustafa II. (1695-1703) enjoyed their state in their palace on the Golden Horn. The latter indeed tried to emulate his warlike ancestors; but the Austrians under Prince Eugene effectually cooled his zeal at the disastrous battle of Zenta (1697). The treaties of Carlovitz (1699) and that of Passarovitz (1718) mark the end of Turkish rule in Hungary, Transylvania, and Podolia, and brought the frontier to very nearly the same line as it occupied before the treaty of Berlin in 1878.

Ahmed III. (1703-30) was noble enough to refuse to deliver up the refugee king Charles XII. of Sweden to the Russians after the battle of Pultowa, and the result was an invasion of Moldavia in 1711 by the Czar Peter, who, however, soon found himself in great straits, from which he was rescued by the genius and bribes of his queen, afterwards Catharine I. But for her, Peter and his army would have become Turkish prisoners. The recovery of the Morea by the vezîr Damad 'Aly (1715) from the Venetians, and the loss of Belgrade and parts of Servia and Wallachia, recovered during the reign of Mahmûd I. (1730-54), and the commencement of a long war with Persia (see NADIR SHAH) were other events of Ahmed's reign. In 1736 the career of Russian aggression recommenced with the seizing of Azov and Oczakov; but a scheme for the partition of Turkey between Austria and Russia was foiled by the continued series of disgraceful defeats inflicted upon the Austrian armies by the Turks. The Russians, on the other hand, were uniformly successful; but the czarina, desirous of peace, resigned her conquests in Moldavia, and concluded a treaty at Belgrade (1739). 'Osmân III. (1754-57) soon gave place to Mustafa III. (1757-73), under whom the empire enjoyed profound tranquillity; but after his death the Russians, in violation of the treaty of Belgrade, invaded Moldavia. The war with Russia continued during the succeeding reign of Abdul-Hamîd I. (1773-89); the fortresses on the Danube fell; and the main army of the Turks was totally defeated at Shumla. The campaign was ended July 1774, by the celebrated treaty of Kuchuk Kainarji. In defiance of its provisions the czarina in 1783 took possession of the Crimea and the whole country eastward to the Caspian. The sultan was compelled, by his indignant subjects, to take up arms in 1787. In 1788 Austria made another foolish attempt to arrange with Russia a partition of Turkey; but, as before, the Austrian forces were completely routed. The Russians, however, with their usual success, had overrun the northern provinces, taken all the principal fortresses, and captured or destroyed the Turkish fleet. The accession of Selîm III. (1789-1807) was inaugurated by renewed vigour in the prosecution of the war; but the Austrians had again joined the Russians. Belgrade surrendered to the Austrians, while the Russians took Bucharest, Bender, Akerman, and Ismail (see SUVÓROFF); but the critical aspect of affairs in western Europe made it advisable for Russia to terminate the war, and a treaty of peace was accordingly signed at Yassy, 9th January 1792. By this treaty the provisions of that of Kainarji were confirmed; the Dniester was made the boundary line, the cession of the Crimea and the Kuban was confirmed, and Belgrade was restored to the sultan. Numberless reforms were now projected for the better administration of the empire. The people were, however, hardly prepared for so many changes, and the sultan's projects cost him his throne and life. The occupation of Egypt by the French brought on a war between them and the Turks, in which the latter, by the aid of the British, were successful in regaining their lost territories. After the ephemeral reign of Mustafa IV. (1807-8), the able and energetic Mahmûd II. (1808-39) ascended the throne; and though his dominions were curtailed by the loss of Greece, which established its independence in 1828, and of the country between the Dniester and the Pruth, which by the treaty of Bucharest in 1812 was surrendered to Russia, and in spite too of a disastrous war with Russia in 1827-28, the reformation he effected in all departments of the administration checked the decline of the empire. Egypt, during his reign, attempted unsuccessfully to throw off the authority of the sultan (see EGYPT, Vol. IV. p. 242). His son, Abdul-Mejîd (1839-61), continued the reforms commenced in the previous reign (see STRATFORD DE REDCLIFFE); but the czar, thinking that the dissolution of the Ottoman empire was at hand, constantly tried to wring from the sultan some acknowledgment of a right of interference in the internal affairs of the country. It was an attempt of this sort to obtain the exclusive protectorate of the members of the Greek Church in Turkey, that brought on the Crimean War (q.v.) of 1853-55, in which the Turks were effectively supported by England, France, and Sardinia. The treaty of Paris (1856) restored to Turkey the command of both sides of the lower Danube, excluded the czar from his assumed protectorate over the Danubian principalities, and closed the Black Sea against all ships of war. The Porte, apparently adopted into the family of European nations, made proclamation in the Hatti-Humâyûn of 1856 of equal civil rights to all the races and creeds of the Turkish dominions. But a massacre of Christians in Lebanon and at Damascus provoked western intervention in 1860. Abdul-Mejîd, whose last years were disgraced by irrational profuseness of expenditure, was succeeded by his brother Abdul-Azîz (1861-75). Meanwhile the nominally subject peoples of Moldavia and Wallachia ventured to unite themselves into the one state of Roumania; and in 1866 the empire, becoming more and more enfeebled through its corrupt administration, had to look on while the Roumanians expelled their ruler, and, in the hope of securing western support, chose Prince Charles of Hohenzollern to be hereditary prince of the united principalities. The rebellion of Crete in 1866 threatened a severe blow to the integrity of the empire, but was ultimately suppressed in 1868, in spite of active help from Greece. Servia, already autonomous within her own frontiers, demanded the removal of the Turkish garrisons still maintained in certain Servian fortresses; and in 1867 Turkey saw herself compelled to make this

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concession. In the same year the sultan distinguished the pasha of Egypt by granting to him the unique title of Khedive (q.v.). The vassal king drew down the wrath of his suzerain in 1870 by negotiating directly with foreign courts, and was compelled to give formal tokens of vassalage. But later concessions have made the Khedive virtually independent of Turkey. The Russian government took the opportunity of war between Germany and France to declare, in 1871, that it felt itself no longer bound by that provision of the Paris treaty which forbade Russia to have a fleet in the Black Sea; and a London conference sanctioned this stroke of Russian diplomacy. Between 1854 and 1871 the Turkish debt had increased by more than £116,000,000; and in 1875 the Porte was driven to partial repudiation of its debts. An insurrection in Herzegovina in the later part of 1874 marked the beginning of a very eventful and critical period in the history of Turkey. The insurrection smouldered on through 1875 and part of 1876, and excited all the neighbouring Slavonic peoples. A threatened revolt in Bulgaria in May 1875 was repressed with much bloodshed; and the merciless cruelty displayed by the Bashi-bazouks or Turkish irregulars alienated foreign sympathy from the government. In May Abdul-Azîz was deposed; and his nephew, Murâd V., son of Abdul-Mejîd, who succeeded him, was destined in turn to make way for his brother, Abdul-Hamîd II., in August of the same year. In June Servia declared war, and Montenegro followed her example. Before the end of the year the Servians were utterly defeated, in spite of the help of many Russian volunteers; but the state of affairs in the Turkish provinces seemed to call for a conference of the great powers at Constantinople. The proposals then made for the better government of the Christian subjects of Turkey were rejected by the Turkish authorities, who had, during the conference, taken the extraordinary step of bestowing a purely nominal parliamentary constitution on the Ottoman empire. Russia took upon herself to enforce on Turkey the suggestions of the conference, and on 24th April 1877 declared war. Both in Armenia and Bulgaria the opening of the campaign was favourable to Russian arms, but later the Turks rallied and seriously checked the triumphant progress of the invaders. Even after the Russian forces had been greatly augmented the Turks resisted energetically. Kars, besieged for several months, resisted till the middle of November; Erzerûm did not surrender until after the armistice had been concluded. Osmân Pasha, who established himself in Plevna early in July, repelled with brilliant success repeated and determined assaults from a besieging army of Russians and Roumanians; and he had so strengthened the fortifications as to be able to hold out until the 10th December, when he surrendered. Desperate fighting in the Shipka Pass had failed to expel the Russians from their position in the Balkans; but within a month of the fall of Plevna the Russians captured the whole Turkish army that was guarding the Shipka Pass, and then easily overran Roumelia. The victorious Muscovites occupied Adrianople in January 1878; on the last day of that month an armistice was concluded; and in March the 'preliminary treaty' of San Stefano was signed. After grave diplomatic difficulties, owing chiefly to the apparent incompatibility of English and Russian interests, a Congress of the Powers met at Berlin, and sanctioned the cessions and other territorial changes which, with modifications, were carried out between 1878 and 1881, as has been already noticed.

Von Hammer-Purgstall's *Geschichte des Osmanischen Reiches* (1834–35) is the standard history of Turkey, which has been largely used in Sir E. Creasy's accurate *History of the Ottoman Turks* (1854), and in the present writer's *Turkey* ('Story of the Nations' series, 1888). Among other writers treating of special periods may be mentioned Finlay, Chesney, H. von Moltke, Kinglake, Freeman, and the diplomatic papers of Gentz, Metternich, and Lord Stratford de Redcliffe.

Literature.—By Turkish literature we understand that of the Osmânlîs, 'the Turks' *par excellence*. It is true there is an eastern Turkish language, represented (among others) by the Jagatai or Chaghtai dialect, in which the Emperor Bâber wrote his 'Memoirs' (*c.* 1535), but the eastern Turkish idioms, interesting as they are to the philologist, hold a small place in literature compared with the Ottoman development. Of Turkish literature in this restricted sense there is a great quantity, but it has never achieved a high reputation. The reason is found in its lack of originality, in the absence of any characteristic national flavour. Turkish poetry is closely modelled upon the Persian style with which the Ottomans naturally became familiar during their early association with the Seljûks (q.v.), who had become deeply imbued with Iranian ideas in their long residence among the Persians. Like the Seljûks, the Osmânlîs assimilated the literature of the people they subdued. Firdausî and Nizâmî had already written their masterpieces before the name of Ottoman was heard, and at the time of their settlement in Asia Minor Sa'dî and Jelâl-ed-dîn Rûmî were attracting the admiration of the eastern world. The latter was a resident at Iconium (Kôniya), the Seljûk capital, and his mystical verses or *mesnevis* impressed their character upon the whole literature of the new power then rising in Anatolia. Ottoman poetry is full of the subtle esoteric ideas which are characteristic of its Persian exemplars. Its long metrical romances, while apparently treating of the loves of Leylî and Mejnûn, of Khusrev and Shîrîn, or of Joseph and Zuleykha, are really occupied with the deeper thoughts of the longing of the soul for God, the yearning of the heart for heavenly wisdom, the struggle between human passion and the endeavour towards divine serenity. The short odes or *ghazels*, the most characteristic of Ottoman poetic forms, 'though outwardly mere voluptuous songs, are in reality the outpourings of hearts drunken with the love of God.' Nor is the mystic spirit the sole gift of Persia to the Turkish poet. He has also borrowed the history and mythology of his predecessors, and, instead of the deeds of the old Turkish chiefs and the cult of the gods of the Caspian nomads, he celebrates the prowess of Persian heroes, of Rustem and Jemshîd, Kay-Khusrev and Ferîdûn, and the loves and tragedies of Leylî and Shîrîn and other Persian heroines. And the Ottoman poet followed the forms as well as the ideas of his Iranian masters, such as the *kasida* or Arabian lyric, adopted by the Persians, in which the second hemistychs rhyme throughout the whole length of the composition; the Persian *mesnevi*, or rhymed couplet; and the *ghazel* or sonnet of the East. In all these the Persian love of playing upon words, far-fetched conceits, and extreme elaboration of metaphor is not merely emulated but exaggerated to intolerable excess: the grace of expression and finish of the form alone redeem the artificiality of the style and thought. Turkish poetry, it must be admitted, is lamentably unreal: it lacks warmth, and earnestness, and sincerity. It is throughout essentially a court poetry, mannered and insincere. There is nothing robust or healthy about it. There is nothing strong or masculine in its love or its patriotism. Throughout we trace the effects of an artificial town life, where genius is cramped in convention, and poetic art is no longer an inspiration, but a cast from the face of the dead.

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Ottoman poetry begins soon after the establishment of the Ottoman empire. Already in the beginning of the 15th century Ahmed Dâ'î's 'gay and flowing songs of love and wine' delighted the court of Prince Suleymân at Adrianople, and poems had been indited by Ghâzî Fâzil, who had crossed the Hellespont on a raft with that prince on the night when the Osmânlîs gained their first foothold in Europe. To write poetry soon became part of the accomplishments of kings and courtiers. Of the thirty-four sultans of Turkey twenty-one were poets of a sort, and Amurath the Great (Murâd II.), Mohammed the Conqueror, and Selîm I. (the Grim) were accounted bards of repute. The unhappy Prince Jem was especially noted for his poetic talent; and from Murâd II. to Murâd IV. (1421–1623) twelve successive sultans left poems which have come down to us. Generals and ministers followed the imperial example. The grand vezîr Mahmûd Pasha (d. 1474), the conqueror of Negroponte, delighted in the composition of *ghazels*, and Kemâl Pasha Zâda (d. 1534), as he rode to the conquest of Egypt with the Sultan Selîm the Grim, beguiled the way with recitations of the leading events of Egyptian history in choice Turkish verse. He was the author of the *Nigâristân*, a poem modelled on the *Gûlistân* or 'Rose-Garden' of Sa'dî.

The greater poets of Turkey, however, were not high dignitaries, but sons of mechanics, cutlers, saddlers, shoemakers; few were of rank or wealth. Their numbers and their merits rise and fall as the tide of Turkish conquest flows and ebbs. It is ever in a period of strong national feeling that the poetry of a people is called forth; and it was in the golden prime of Sultan Suleymân, when the confines of the kingdom were at their broadest, when the name and fame of the Ottoman empire stood higher than ever before or since, that the opportunity of Turkish poetry arrived, and with it came the masters of the art. To the age of Suleymân and his predecessor Selîm belong Mesîhî (d. 1512), Lâmi'î (d. 1531), Ghazâlî (d. 1534), Fuzûlî (d. 1562), Fazlî (d. 1563), and Bâkî (d. 1600). The best Turkish poetry is chiefly included in this epoch, which partly corresponds in time with our Elizabethan era. Lâmi'î's works, to which Von Hammer devoted 174 pages of his great History, include poems on old Persian romances, besides a multitude of *ghazels* and other short pieces. Fuzûlî, on the whole the greatest of Turkish poets, in spite of his provincial idiom, is best known by his *Leylî and Mejnûn* and his charming odes. Bâkî, the most famous of Turkish lyricists, was the friend of four successive sultans, filled some high offices of state, and received the unhesitating homage of all the poets of his day and the admiration of all succeeding generations. His famous elegy on Suleymân the Great is unsurpassed in Ottoman literature. The appreciation of nature which is shown in such poems as Mesîhî's 'Ode to Spring' and Bâkî's and Lâmi'î's odes to 'Autumn,' and which is characteristic of their period, forms one of the best features of Turkish poetry. Their love-songs, on the other hand, are disappointingly stilted and artificial; and it is singular that, in spite of their military renown, the Turks have no martial poetry of the old time: there is hardly a respectable war-song in the whole range of mediæval Ottoman literature.

The classical period of Ottoman poetry, which began with the 16th century, did not end with the glorious reign of Suleymân the Great (d. 1566). Nef'î of Erzerûm (d. 1635), the most renowned of Turkish satirists, wrote in the time of Murâd IV.; Nabî (d. 1712) wrote thousands of couplets of a didactic tendency; and Nedîm (d. *c.* 1727), perhaps the most finished and certainly the most blithe of Turkish singers, belongs to the time of Ahmed III. He was the last of the old classical school of Ottoman poets, though Sheykh Ghâlib (d. 1795), the author of 'Beauty and Love' *(Husn-u-Ashk)*, was little inferior to any of the older writers. During the past half century a notable change has come over Turkish poetry. It is as voluminous as ever, but it turns for inspiration to Paris instead of Shîrâz. *Ghazels* and *kasîdas* have given way to western forms; the very vocabulary has been modified; and a modern Ottoman poem would hardly be comprehensible to the older writers of the classical epoch. Wâsif, who tried to write in colloquial Stambûlî Turkish, 'Izzet Molla, 'Akif Pasha, and the poetesses Fitnet and Leylâ were among the lights of the transition period; Shinâsî, Ekrem, and Hamîd Bey the dramatist have been the leaders of the European style, of which it is too early yet to express a general criticism. One of the modern school has to some extent wiped out the stigma, already mentioned, of the want of martial poetry among the Turks: Rif'at Bey has at last written an Ottoman war-song.

Turkish prose writers have been and are very numerous, though here again originality is lacking, and their activity has been chiefly displayed in translations from the Persian and Arabic. One of their earliest works is the well-known *History of the Forty Vezîrs*, a collection of old folk-stories, written in the first half of the 15th century, and now translated by E. J. W. Gibb. Sinân Pasha, however, the vezîr of Mohammed the Conqueror, was the first prose stylist of merit. Sa'd-ed-dîn, the historian, in spite of his elaborate style and alliteration, was a writer of conspicuous ability, and Na'îma, his successor, is as vigorous and direct as Sa'd-ed-dîn is circumlocutory and ornate. The *Tâj-et-Tevârîkh* of the former goes down to 1520, and Na'îma's history covers the ground from 1591 to 1659. Evliya the traveller, and Hâjjî Khalîfa, an encyclopædic writer on history and bibliography, are among the best-known Turkish authors. Jevdet Pasha is the leading Turkish historian of the 19th century, and Kemâl Bey one of the most notable modern men of letters. Printing was begun in Turkey in 1728, and the products of the Turkish press in the present day are numerous and often valuable. Turkish prose as well as poetry has been revolutionised by the introduction of western ideas since the reforms of Mahmûd II.

The standard but not very satisfactory work on Turkish poetry is Von Hammer-Purgstall's *Geschichte der Osmanischen Dichtkunst* (Pesth, 1836). The best English works are Sir James W. Redhouse's *History, System, and Varieties of Turkish Poetry* (1878) and E. J. W. Gibb's *Ottoman Poetry* (1882). See also the latter's chapter on Ottoman literature in the present writer's *Turkey* ('Story of the Nations' series), and the article on Ottoman Poetry by the present writer in *Macmillan's Magazine*, January 1883. Redhouse and Wells have compiled the best Turkish dictionaries and grammars.

Turkey *(Meleagris)*, a genus of gallinaceous birds, according to some ornithologists of a distinct family, Meleagridæ, but included by others in Phasianidæ. The head is bare, the neck wattled, and the bill of the male surmounted with a conical fleshy caruncle, sometimes erected, sometimes elongated and pendulous. A curious tuft of long hair springs from the base of the neck of the male, and hangs down on the breast. The bill is rather short, strong and curved; the tail is broad and rounded, capable of being erected and spread out, as the male delights to do when he struts about in pride, with wings rubbing on the ground, uttering his loud peculiar *gobble*. The Common Turkey, the largest of gallinaceous birds, well known as an inmate of our poultry-yards, is a native of North America, where it exists in two forms. The typical

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M. gallo-pavo, with the tail tipped with rusty, and the tail-coverts with dark chestnut, ranges from southern Canada to Florida and eastern Texas, and westward to the edge of the great Plains; farther south it is replaced by a subspecific form, *M. mexicana*, having the tail and its coverts tipped with buffy white, and inhabiting the table-lands of Mexico, and extending north to the southern border of the United States, and south to Vera Cruz. It is from this latter race that our domestic turkeys are descended, the breed having been introduced into Europe in the beginning of the 16th century by a lieutenant of Sebastian Cabot. Norfolk and Cambridge are celebrated for their turkeys; the Norfolk breed is black, and the Cambridge variegated or bronze, the birds of the latter colour most resembling the wild species. This, however, attains a larger size in its native woods than in the poultry-yard; and the finest tame turkeys are those of the American bronze breed, which has been created by crossing tame birds with the true *M. gallo-pavo*. The size of the birds has been thus increased, and the young rendered hardier. But the wild turkey is richer in colour and stronger on the wing than the tame; though even in the wild birds the wings are short, scarcely extending beyond the base of the tail, and their powers of flight are not great, inasmuch as when on their migrations they come to a river a mile wide many fall in on attempting to cross it. These, however, usually save themselves by swimming. Wild turkeys, like other game, have greatly decreased in the United States. The males associate in flocks of from ten to one hundred, and seek their food during great part of the year apart from the females, which go about singly with their young, or associate in flocks, avoiding the old males, which are apt to attack and destroy the young. At the pairing-time desperate combats take place among the males. Wild turkeys feed on all kinds of grain, seeds, fruits, grass, insects, and even on tadpoles and lizards. They roost on trees and make their nests on the ground, merely gathering together a few dry leaves, and often in a thicket. The eggs are usually from nine to fifteen in number, sometimes twenty. The birds spread themselves in summer over the higher grounds, but in winter congregate in the rich low valleys. The sexes mingle in winter, and form larger flocks than in summer.

On account of the size and the excellence of its flesh and eggs, the turkey is one of the most valued kinds of poultry. The management of it differs little from that of the common fowl. The young are tender for the first few weeks, and require care, particularly to keep them from getting wet by running among long grass, or the like; but afterwards they are sufficiently hardy. Nettles are excellent food for young turkeys, and are often chopped up for them, to be given in addition to grain, onion tops, dandelion, hard-boiled eggs, meal, boiled potatoes, and other such food.

The only other known species of turkey is *Meleagris ocellata*, a native of Yucatan and the adjacent parts of Honduras. It is not so large as the common turkey, and has no tuft on the breast. The neck is less wattled, but the head has a number of fleshy tubercles. The plumage is beautiful, rivalling that of the peacock in metallic brilliancy: blue, green, bronze, red, and golden hues being intimately and finely mingled, and forming *eyes* on the tail; whence the specific name. In South Africa the Bald Ibis (*Geronticus calvus*) and in Australia the Australian Bustard (*Eupodotis australis*) are incorrectly called wild turkeys. The so-called Brush-turkey or Talegalla (q.v.) belongs to a different family of gallinaceous birds, the Megapodes or Mound-birds (q.v.).

Turkey Buzzard. See VULTURE.

Turkey-red. See DYEING, Vol. IV. p. 137.

Turkmanshai, a village of Azerbijan, 65 miles ESE. of Tabriz, is the place where, on February 22, 1828, was concluded the treaty between Persia and Russia, by which the former resigned to the latter the Armenian provinces of Erivan and Nahitchevan.

Turks, an important and wide-spread family of the human race, found from the banks of the Lena through central Asia and Asia Minor to the European shores of the Bosporus and the Ægean. Formerly classed amongst the 'Turanian' peoples, it is now more usual to say that they are of the Mongolo-Tartar ethnological group, and speak languages of the Ural-Altaic family. To them belong at the present day Yakuts, Siberian Tartars, Kirghiz, Uzbegs, Turkomans, Karakalpaks, Kazan Tartars, and Dungans, as well as the Ottoman Turks; linguistically the Bashkirs and Tchuwashes fall under the same head. Old Turkish stocks no longer extant were the Petschenegs in Russia, the Cumanians, the Chazars, the White Huns, and the Seljuks (from whom the Ottoman Turks are sprung). The existing Turkish peoples are all Moslems, save the Yakuts, and mostly nomadic. They have often sent forth conquering hordes of warriors, and have given ruling families or races to China, Persia, India, Syria, Egypt, and the empire of the Califs.

See especially the articles TURKESTAN and TURKEY; ASIA, Vol. I. p. 493; SELJUKS; BABER; TAMERLANE; TARTARS; Vambéry, *Skizzen aus Mittelasien* (1868), and *Das Türkenvolk* (1885).

Turk's Islands. See CAÏCOS.

Turmeric, the rhizome or rootstock, usually having pointed cylindrical branches, of *Curcuma longa* (nat. ord. Zingiberaceæ). This species of Curcuma is a handsome herbaceous plant, the flowering stem of which has long, narrow, sheathing leaves, and above these a leafy spike of yellow flowers. It is cultivated all over India, but it is also grown in the East Indian Islands, China, and the Fijis. The tubers, which are yellowish externally, yield a deep yellow powder of a resinous character. Turmeric has been long employed in the East as a medicine, and as a yellow dye which can be changed into a deep, brownish red by alkalies, but neither colour is permanent. It is a principal ingredient in some Indian articles of food, including curry-powder. In western countries it is not now much used in dyeing, nor in medicine, but it is very useful as a chemical test for the presence of alkalies, any alkaline substance quickly changing its colour from yellow to reddish brown. Mustard is frequently adulterated with turmeric, and so also are some other substances. Turmeric has an aromatic

Turmeric (*Curcuma longa*): *a*, root; *b*, spike of flower; *c*, leaf before expansion (Bentley and Trimen).

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taste and a peculiar odour not unlike that of ginger. The odour is due to an essential oil called *turmerol*, of which the tubers contain about 1 per cent.; and the colouring principle is known as *curcumin*. African turmeric, brought from Sierra Leone, is obtained from a species of Canna.

Turnau, a town of Bohemia, on the Iser, 64 miles by rail NE. of Prague. Its specialty is jewellery. Here on 26th June 1866 the Prussians defeated the Austrians. Pop. 4948.

Turnberry, a shattered castle on the Ayrshire coast, 6 miles N. of Girvan. Either it or Lochmaben was Robert Bruce's birthplace. A lighthouse (1874) stands within the ruined walls.

Turnebus, the Latinised family name of Adrien Turnèbe, a great scholar of the 16th century, born at Rouen in 1572. According to some accounts he was of Scottish descent, his family name having been originally Turnbull. Educated at the university of Paris, he greatly distinguished himself in the study of the ancient classics, and eventually, as professor of Greek and Philosophy in the Collége Royal in Paris, attained a European reputation. Montaigne, who knew him personally, declares that he was the greatest man of letters who had appeared for a thousand years. When Turnèbe died (12th June 1565) it was the universal opinion that learning and virtue could not have sustained a greater loss. See Maittaire, *Historia Typographorum aliquot Parisiensium* (8vo, Lond. 1717). An account of Turnèbe is also prefixed to his miscellaneous works published at Strasburg in 1600.

Turner, CHARLES TENNYSON, born July 4, 1808, at Somersby, second son to the vicar (see TENNYSON, ALFRED), educated at Louth School and Trinity College, Cambridge; graduated 1832, ordained 1835; for many years the devoted vicar of Grasby, a village in the Lincoln wolds. In 1837 he married Louisa Sellwood, sister to Emily, Lady Tennyson. Took the name of Turner under the will of a relation; died April 25, 1879; commemorated by his deeply loved and loving brother Alfred in the lines *Midnight*, June 30, 1879.

From 1830 to 1873 C. T. Turner published several small series of verse (collected in one volume, with a memoir, 1880). The first, issued during his college days, won much praise from S. T. Coleridge. Throughout life the poet adhered to the sonnet form, but with an irregular distribution of the rhymes. His was a nature singularly and nobly simple, pure, and tender with a woman's tenderness: 'at once,' his nephew Hallan (preface to the volume of 1880) justly observes, 'childlike and heroic.' Add that he was a well-read scholar, gifted also with very fine and sympathetic observation of nature and of village-life. Hence these idyllic sonnets—sincere, pathetic, subtle, sometimes verging on quaintness—cover, in their pensive range, a vast number of motives from English country ways. By him and by his admirable contemporary poet, W. Barnes of Dorset, a hundred wild flowers, we might say, effaced or disappearing under the remorseless ploughshare of modern progress, have been preserved for us. Such work in an age like ours should have a wide appeal to Englishmen. But fit audience and few will almost uniformly be the fate of the writer who confines himself to the form of sonnet-sequence.

Turner, J. M. W., the most celebrated of English landscape-painters, is generally believed to have been born in Maiden Lane, Covent Garden, on the 23d of April 1775, but he himself said to Mr Cyrus Redding that he was born at Barnstaple in Devonshire. His full names were Joseph Mallord William, of which he signed only the initials.

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He was the son of William Turner, a barber, who taught him to read and sent him to school at Brentford and afterwards to Margate, but he had little regular education and remained almost illiterate through life. He may possibly have heard something about Rome and Carthage at Brentford, cities that always had a great interest for him. Very early in life he got some initiation into architecture and worked with the architect Hardwick, who perceived his natural gift for painting and recommended him to become a pupil of the Royal Academy. Turner's childhood was remarkable for the absence of any civilising feminine influence. His mother is said to have had an ungovernable temper, and to have been almost if not quite insane. In other respects the early life of Turner was more fortunate. He soon found friends and instructors. He knew Sir Joshua Reynolds and studied in his house. He got an early initiation into water-colour through his acquaintance with Dr Monro and Girtin, and, being in a city where art was to be seen, he became acquainted with most of the elder masters of landscape, at least in their works, and with those of the then modern water-colour painters. Turner began exhibiting at fifteen when still an incipient student, but such was his precocity, and perhaps also the relatively low state of art at that time, that he went on exhibiting and learning during the same years. At eighteen he began to travel, being sent by a publisher into four English counties, and at twenty he had visited Wales. A year later he made architectural drawings in some of the principal English cathedral cities. Like Titian he was wide-awake and hard at work already in his profession early in the morning of life. On attaining his majority he was already an established artist, and as early as 1799 he began as a marine painter. In the same year, at the age of twenty-four, he was elected an Associate of the Royal Academy. At twenty-eight he was elected Academician, and at thirty-three professor of Perspective. During these years he does not appear to have earned a large income, but being a strict economist soon knew how to place himself above pecuniary difficulties.

The biography of Turner is of little interest except as a study of character. He never married, he took no share in public life, kept aloof from society, and knew no changes, except a few changes of residence in England and his home or foreign tours. Though economical to miserliness, after 1808 he had always two residences and sometimes even three. This indulgence may be attributed to a love of personal secrecy and obscurity. His town-house in Queen Anne Street was a sufficiently commodious residence with a studio and a gallery; his country-houses were first at Hammersmith and afterwards at Twickenham. By hard work and economy Turner soon attained pecuniary independence, and worked in complete freedom from any money-pressure, yet with remarkable rapidity. His travels were of the nature of furtive disappearances; he wandered much about England, France, Switzerland, and Italy, but the story of these excursions is told by his works alone, except that some chance traveller met him now and then, always with his pencil in his hand and travelling very economically, for the most part on foot. That his travels were a part of his life is indicated by the title of one of his publications, *Turner's Annual Tour*. He rose very early in the morning, worked many hours each day and always in complete secrecy, and it is not believed that in his own house he ate any regular meals. His houses were very badly kept, even his gallery of pictures being dirty and disorderly. So he went on in solitary toil till old age, and died in his seventy-seventh

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year (19th December 1851) in a temporary lodging at Chelsea under the assumed name of Booth.

Everything in Turner is indicative of the man of genius. His artistic gift was a special faculty, cultivated to the utmost by a long life of the hardest labour and to the neglect of everything else. The artistic gift that absorbed all his energies was itself of a most peculiar character. He perceived more in nature than any landscape-painter who had preceded him, yet at the same time his imagination was so overpowering that it modified all his materials. His power of drawing was remarkable both for strength and for an extreme refinement, but accuracy was made impossible for him by his constant desire for beauty or sublimity of line and for agreeable composition. He habitually increased the relative height of objects such as towers, hills, river-banks, &c., and he compressed every subject by bringing materials together from all quarters. He almost invariably altered the character of what he saw in order to attain some expression that he desired. His dominant impulses were to make things more beautiful, mysterious, and sublime than they are in nature. His system of light and shade was founded at first on the old masters with their heavy darks; but afterwards in his more independent maturity he worked out another scheme, that of pale general tones with a few strong darks for opposition. Turner was in various ways clever in black and white. Almost all his work done directly from nature consisted of memoranda in chalk or pencil, on gray or white paper, without colour, the colour being often added afterwards from memory. He was also an excellent etcher in pure line, but did not attempt to combine line and shade (except slight indications of shade) in etching, trusting for that to the finishing of his plates in mezzotint. His etched work is the *Liber Studiorum*, begun in 1807 and cut short in 1819. It was to have consisted of 100 plates, of which seventy-one were completed. As a water-colour painter Turner was unrivalled in delicacy and in brilliance of execution, but he never became *technically* one of the supreme painters in oil, nor did he make progress in his later work, which resembled water-colour in principles of treatment. Turner's position in art is that of one of the three most famous landscape-painters (Claude, Turner, Corot). In knowledge of nature he was far superior to the other two, in the sense of elegance at least their equal, and there was a tragic side to his genius that is wanting in the others. Turner has had singularly little practical influence on landscape art, which has gone more in the direction of Constable.

Although by nature very reserved and disposed to keep aloof from mankind, Turner was sometimes friendly and nobly generous. The object of his saving was to found an asylum for distressed artists, an intention plainly expressed in his will, but thwarted by the lawyers because the testator was ignorant of legal forms. Turner kept many pictures that had proved unsaleable at first, though tempting offers were made for them later, and he bequeathed them to the National Gallery on condition that they were to be kept together in rooms bearing his name. Whilst the estimate of his work has risen, it is now understood that his intellect was that of a prodigy with abnormal activity in one direction and feebleness or incapacity in almost all others. His personal appearance too was against him, as he was plain and short and had not the style or bearing of a gentleman.

The following are a few of the most important chronological memoranda of Turner's professional career. 1796, he exhibited eleven pictures at the Royal Academy. 1798, he began to paint mountain scenery, and an effect in the view of Norham Castle, which did much to found his reputation. 1799, date of a naval picture, the Battle of the Nile. 1802, ceased to pay deference to topographic truth, and painted his famous but anti-topographical picture of Kilchurn Castle. 1803, beginning of continental subjects: 'The Vintage at Mâcon,' 'Calais Pier,' also first studies of the Alps. 1806, imaginative picture of the 'Garden of the Hesperides, with the Goddess of Discord choosing the Apple.' 1807, Turner invited a comparison between himself and Claude, by painting his 'Sun rising in Mist' in rivalry with the French master. 1811, 'Apollo and the Python.' 1813, 'The Frosty Morning.' 1815, 'Crossing the Brook,' an idealisation of Devonshire scenery; also the imaginary 'Dido building Carthage.' 1823, an idealisation of Italy in the 'Bay of Baiæ,' and idealised views of Yorkshire in Whitaker's *History of Richmondshire*, marking a great progress in illustration. 1824, *The Rivers of England*. 1825, *The Provincial Antiquities of Scotland*. 1827–38, the *England and Wales* series. 1829, the great imaginative picture, 'Ulysses deriding Polyphemus.' 1832, an idealisation of Italy in 'Childe Harold's Pilgrimage.' 1830–34, vignette illustrations of Rogers' Poems. 1834, illustrations to Scott. 1833–35, *The Rivers of France*. 1834, 'The Golden Bough,' a poetical picture. 1838, 'Phryne going to the Bath as Venus.' (In these years Turner's idealising faculty attained its utmost development.) 1839, 'The Teméraire.' (In 1840 he entered on his decline.) 1843, 'Opening of the Walhalla,' 'The Approach to Venice,' and 'The Sun of Venice'—the two latter remarkably beautiful though unreal. 1844, 'Rain, Steam, and Speed,' a purely impressionist picture attempting the severance of motion from substance.

BIBLIOGRAPHY.—*Modern Painters*, by John Ruskin, M.A., in 5 vols., first published by Messrs Smith and Elder at different dates between 1843 and 1860. This brilliant and famous book did much to increase Turner's reputation amongst the reading classes, but did not create his position, as he had already been for forty-one years an Academician, and had attained wealth and success when the first volume appeared. Mr Ruskin estimated Turner's rank as that of 'the greatest painter of all time,' which is very disputable on technical grounds, especially with reference to his work in oil. A *Life of Turner* by Mr Walter Thornbury appeared in 1862, a carelessly constructed biography, being hardly better than a collection of materials. The next *Life* was that by the writer of the present notice. It appeared in 1878, and was little more than an attempt to put already existing materials into a readable form, as at that date it had become almost impossible to add to them anything of any real importance. In 1879 appeared a *Life of Turner* by Mr Cosmo Monkhouse, which added whatever new details could be ascertained, and contained some valuable biographical criticisms. In 1889 the present writer published a new and shorter *Life of Turner* in French at the *Librairie de l'Art*, Paris. All biographies of Turner must, however, be inevitably meagre and unsatisfactory, as the materials were collected too late and Turner himself left hardly any letters or writings of any kind, and his few notes are very brief. Public interest is concentrated in his works, he himself being so little attractive as a subject for the writer or reader of biography.

Turner, SHARON, was born in London, September 24, 1768, was articled to an attorney at the age of fifteen, and succeeded his master in the business before the period of his clerkship had expired. The intervals of a busy life he gave to hard reading and patient collection of materials, and published a meritorious *History of the Anglo-Saxons* (1799–1805). Other works were the laborious but badly written *History of England from the Norman Conquest to the Death of Elizabeth* (1814–

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15-23), *Sacred History of the World* (1832), a volume of essays and poems, &c. Turner died in London, February 13, 1847. For the last years of his life he enjoyed a pension of £300.

Turnhout, a town of Belgium, in the Campine district, 26 miles ENE. of Antwerp. It has a palais de justice (1371) and manufactures of cotton, linen, lace, paper, &c. Pop. 17,800. Here on 22d January 1597 the Netherlanders, under Prince Maurice, won a victory over the Spaniards; and on 27th October 1789 the patriots over the Austrians.

Turning, the art of shaping wood, metal, ivory, or other hard substances into forms having a curved (generally circular or oval) transverse section; and also of engraving figures composed of curved lines upon a smooth surface, by means of a machine called a *turning-lathe*. The immense variety of work performed by turning-machines necessitates great variations in their construction; but their mode of operation is always the same, and consists in fixing the work in position by two pivots or otherwise, causing it to revolve freely round an axis of revolution of which the two pivots are the poles, and holding a chisel or other cutting-tool so as to meet it during its revolution, taking care that the cutting-tool be held firmly and steadily, and moved about to different parts of the work till the required shape be obtained. Lathes are divided, with respect of the mode of setting them in motion, into *pole*-lathes, *foot*-lathes, *hand-wheel* lathes, and *power*-lathes; with respect to the species of work they have to perform, into *centre*-lathes, which form the outside surface, and *spindle*, *mandrel*, or *chuck* lathes, which perform hollow or inside work, though this distinction is for the most part useless, as all lathes of good construction are now fitted for both kinds of work. *Bed*-lathes are those used by turners in wood, and *bar*-lathes for the best sort of metal-work; and the small metal centre-lathe used by watchmakers is known as a *turn-bench*.

Turnip (*Brassica rapa;* see BRASSICA), a biennial plant, with lyrate hispid leaves; the upper part of the root becoming, especially in cultivation, swollen and fleshy. It is a native of Europe and the temperate parts of Asia, growing in borders of fields and waste places. It is commonly regarded as a native of Britain, although in most cases where it is found apparently wild it may be doubted if it has not derived its origin from cultivated varieties. It has been long cultivated, and is to be found in every garden of the temperate and cold parts of the world as a culinary esculent; it is also extensively grown in fields for feeding cattle and sheep. It was cultivated in India long before it could have been introduced by Europeans, and is common there in gardens and about villages. The cultivated varieties are very numerous. In them the upper part of the root assumes a globose, oblong, or roundish depressed form. Some are common to the garden and the farm, and some of the largest kinds attain such a size as to weigh 20 or 25 lb. Although the turnip is of great value for feeding stock, it is not very nutritious, no less than 90 to 96 parts of its weight actually consisting of water. Garden turnips are sown from the end of March to the end of August; field turnips generally in June, it being requisite that they should not be sown so soon as to incur a risk of their throwing up flower-stems in the first year, which, when it takes place, prevents in a great measure the swelling of the root and renders it coarse and fibrous. In dry weather the plants are apt to throw up flower-stems, and so disappoint the hope of the gardener. Moist cloudy weather is most favourable. Garden turnips are sown and allowed to grow much closer than field turnips, being gradually thinned out, and the thinnings used even when of small size. The garden turnips are generally of comparatively small size, more rapid in growth, and more delicate. The Swedish Turnip, or Ruta Baga, which was introduced into cultivation in Britain, from the north of Europe, more recently than the common turnip, and has proved of very great value to the farmer, is regarded by some botanists as a variety of the same species, and by some as a variety of *B. napus*, but more generally as a variety of *B. campestris*, a species common in cornfields and sides of ditches in Britain and the north of Europe.

The cultivated turnip grows best in a rich free soil. The mode of culture varies with the soil. Where the soil is light and dry a smaller amount of ploughing, harrowing, and drilling is necessary than on stiff soils. The turnip is not well suited to clay soils, although it is often grown on them. A complete pulverisation of the soil is requisite before the sowing of the seed. On light soils a crop of turnips generally succeeds wheat or oats. Turnip-land is generally made up in raised drills by the plough, and the seed is sown by the drilling-machine on the top of the narrow ridges, which are about 27 inches wide. Moderate dressings of artificial manure, such as superphosphate of lime, crushed or dissolved bones, kainit and nitrate of soda, or other such manures, produce great crops of turnips. The more general practice, however, is to give a mixed dressing of farmyard dung and artificial manure. The young plants are thinned out by the hand-hoe to from 9 to 11 inches apart, and the ground is stirred and carefully kept clean by the plough or horse hoe. The turnip-crop is thus of great use in clearing the land of weeds. In many places part of the crop is eaten on the ground by sheep, which are confined to a small part of the field by means of movable fences. It is common to leave one of each three rows of turnips for this purpose, the other two rows being carried to the farmyard for feeding cattle or stored. Turnips are stored either in a house or in conical heaps, covered with straw and earth. They are sometimes protected from frost by being earthed up in rows by the plough. Some kinds are much more easily injured by frost than others; the Swedish turnips least of all.

The introduction of the turnip as a field-crop is one of the most important events in the history of British agriculture. It has rendered possible a rotation of crops which has been extremely advantageous, and has made the supply of butcher-meat more constant, by providing a supply of winter-food for cattle and sheep, whereas formerly all depended on the pasture. As a field-crop turnips were not raised in Britain till the end of the 17th century. Turnip-husbandry was introduced into Roxburghshire from Leicestershire about the year 1764, but was soon carried to a perfection in Scotland far beyond what it had previously reached. The climate of Scotland is well adapted for it, as is also that of Ireland; whilst the climate of North America is so unfavourable to it that it has not become an important crop there. Turnip-crops in Britain suffer very much from the two distinct diseases called anbury, or club-root, and finger-and-toe (see ANBURY). Superior culture is the best means of preventing these diseases. Plants weakened by drought are liable also to suffer from a white mould, a species of Oidium, which attacks the leaves and greatly injures the plant.

The turnip crop has to encounter many insect enemies. The most destructive in recent years has been the turnip-fly (*Phyllotreta nemorum*, Chevrolat), which devours the young plants before

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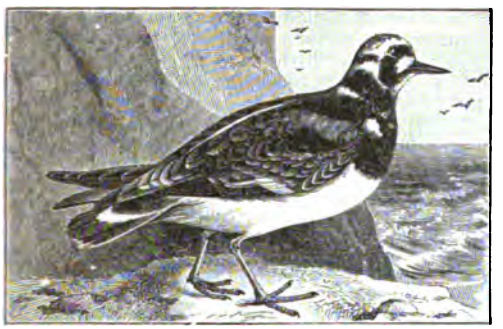
they are strong enough to be thinned. The leaves of the young turnip-plants are also attacked and often much injured by the green-fly or turnip-aphis (*Aphis rapæ*, Curtis); by the maggots of two kinds of Diptera—*Phytomyza nigricornis*, Macquard, the black-leaf miner, and *Drosophila plana*, Fallen, the yellow-leaf miner; by the caterpillar of the diamond-back turnip-moth (*Cerostoma xylostella*, Curtis); by the caterpillar of the common dart moth (*Agrotis segetum*, Westwood); by the grubs of the turnip sawfly (*Athalia spinarum*, Fabricius); and by at least two varieties of weevil, Curculio, the most destructive being the little Curculio, *Centorhynchus contractus*, $\frac{1}{14}$ inch long, which punctures the seed leaves with its rostrum. The diamond-back moth fortunately seems to pay its visits of destruction at long intervals. It played great havoc with the crop in England and Scotland in 1891, destroying it beyond recovery in many parts. In Ireland the attack was lighter. Earlier serious attacks occurred in 1851, 1837, and 1826. For all insect attacks the best preventive measure is a dressing of stimulating manure to force on the growth of the plants. Spraying the crop with a mixture hurtful to the insects, by means of the Strawsoniser, an air-power distributor, is also recommended.

Turnpike Roads. See ROADS, TOLL.

Turnsole (Old Fr. *Tournesol*, 'turning to the sun'), a name sometimes given to the Heliotrope and other plants, especially to the euphorbiaceous *Chrozophora tinctoria*, from which a deep purple dye is obtained. Turnsole-blue is a name sometimes given to a colour obtained from archil.

Turnspit. See DACHSHUND.

Turnstone (*Strepsilas*), a small genus of birds of the plover family (Charadriidæ), intermediate between the true plovers and the sandpipers. The Common Turnstone (*S. interpres*) appears in



Turnstone (*Strepsilas interpres*).

Britain as a winter migrant, but is not known to breed there; its breeding-places being the shores of the Arctic Ocean in Europe, Asia, and America, though it breeds on the coasts of Scandinavia down to Denmark, laying four eggs of a greenish-gray colour, spotted and streaked with bluish-ash and brown, in a shallow depression lined with a few dry leaves and bents. In winter the turnstone is found on the seashore all over the world, being probably the most cosmopolitan of all birds. It derives its name from its habit of turning over stones with its bill in search of its food, which consists of small crustaceans and molluscs. The common turnstone is 9 inches in length, and is handsomely marked with black, white, and chestnut; the last-named colour is reduced in autumn, when the plumage becomes duller; the legs and feet are orange. Another species, the Black-headed Turnstone (*S. melanocephalus*), breeds in Alaska and winters in California; and some place the Surf-bird (*Aphriza virgata*) in this genus.

Turpentine is a semi-solid resinous substance secreted by various coniferous trees. The name turpentine is commonly understood to mean the product of the Scotch pine, the swamp pine of America, and the *Pinus maritima* of France. Venice turpentine is obtained from the larch, and Chian turpentine from the 'Turpentine-tree' (see PISTACIA); but from a commercial point of view they are practically unused. The chief supplies of turpentine are obtained from America, and to a less extent from France. Cavities are cut through the bark and into the wood about one foot from the ground, and the bark hacked a little above. The exuded turpentine runs into these cavities, commencing to flow in May, and if the bark is hacked a little higher up every ten days a constant supply is obtained throughout the summer. In consequence of the necessity of injuring the bark at a higher and higher point, in the course of years the hacking takes place at a height of 12 to 15 feet, the tree remaining productive for about fifty years. The first year's yield is the purest, having the shortest distance to run down the trunk into the cavity; but afterwards a portion concretes as it passes down, and constitutes the common frankincense or *gum thus* of commerce. The turpentines are mixtures of resin and essential oil. The latter, amounting to from 15 to 30 per cent., consists chiefly of hydrocarbons having the chemical formula $C_{10}H_{16}$. When distilled along with water the oil of turpentine passes over, and the Resin (q.v.) or rosin remains behind.

Oil of Turpentine does not always possess the same properties. Its boiling-point ranges from 305° to 341° (152° to 172° C.), and the specific gravity from ·856 to ·870. Some samples rotate the plane of polarisation to the right, and others to the left. These variations are due to the presence of different isomeric compounds. Oil of turpentine, or turpentine as it is often called, is a powerful solvent of resins and oils, and is much employed in the manufacture of varnishes and oil paints. It is very inflammable, and unites with chlorine so energetically as to burst into flame when brought in contact. When air is passed through it it becomes powerfully antiseptic. Applied to the skin it acts as a local irritant, and is much employed in the treatment of rheumatism, &c. When agitated with sulphuric acid and allowed to separate it yields on distillation a fragrant liquid, terebene, which is much employed as an antiseptic and internally in the treatment of coughs.

Turpin. Archbishop of Rheims, friend and companion of Charlemagne, the supposititious author of the *Historia Karoli Magni et Rotholandi*. According to Gaston Paris, this falls into two parts: the first (*c.* 1050) dealing in five chapters with Charlemagne's conquest of Spain without reference to Roland; the second (early in 12th century) giving the legend of Roland, the treachery of Ganelon, Roland's heroic death at Roncevaux, and the king's vengeance upon the Saracens. In the *Chanson de Roland* itself Turpin dies beside its hero, and is buried with him and Oliver at Blaye near Bordeaux. There was actually an Archbishop Tilpinus of Rheims (753-800); but there can be no doubt that the romance in its present form was put together in the first third of the 12th century, most probably with a view to the glory of St James of Compostella. From internal evidence it has seemed to critics highly probable that Pope Calixtus II. either wrote or at least inspired the work himself while yet Guy de Bourgogne, Archbishop of Vienne. The conclusion of Gaston Paris in his admirable work, *De Pseudo*

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Turpino (1865), however, is that the first five chapters were written in Galicia, before the pretensions of Compostella had risen so high as they did towards the end of the 11th century; that the remaining chapters are too secular and too little in harmony with Galician traditions to have been written, or even formally sanctioned, by Calixtus; and that the epistle sometimes appended, bearing the name of that pope, is a manifest forgery. He goes on to state that the archbishop of Vienne, after the death of his brother in 1108, visited Compostella, and conjectures that one of his train found the first five chapters there, and that the remaining chapters were adapted from various French chansons by a monk of St André at Vienne. Reinhart P. A. Dozy, in the third edition of his *Recherches sur l'Histoire et la Littérature de l'Espagne pendant le Moyen Age* (1881, tome ii.), concludes that these five chapters have been written by a Frenchman, and that subsequently to 1131; that chap. xx. is due to one of the clergy of Compostella, who wished to push its claims against Toledo for the primacy of Spain, perhaps between 1120 and 1124, perhaps much later; and that chap. ix. names three Mohammedan princes of Spain and Africa who flourished respectively in 1106–43, 1116–23, and 1125–38. Gaston Paris in *Romania* (tome xi. July 1882) accepts most of Dozy's conclusions, admits that the five chapters were written by a Frenchman at Compostella after 1069, but is reluctant to place them much later than 1100. He finally conjectures that the whole work may have been completed towards 1150 by Aimeri Picaud, the author of the Itinerary to Compostella.

The chronicle was printed by Simon Schard in *Germanicarum rerum IV. vetustiores chronographi* (Frankf. 1566), and by Justus Reuber in his *Veteres Scriptores* (Frankf. 1584); but the edition now generally used is that of Sebastiano Ciampi (Florence, 1822). An edition was prepared under the auspices of the Montpellier Société pour l'Étude des langues Romanes, by Ferdinand Castets (Montpellier and Paris, 1880). See Gaston Paris, *De Pseudo Turpino* (Paris, 1865); also the excellent account in H. L. D. Ward's *Catalogue of Romances in the Department of Manuscripts in the British Museum* (vol. i. 1883).

Turpin, Dick, born at Hempstead, Essex, in September 1705, was, successively or simultaneously, a butcher's apprentice, cattle-lifter, smuggler, housebreaker, highwayman, and horse-thief. He was hanged at York on 10th April 1739 for the murder of an Epping keeper, besides which he had accidentally shot his comrade, King. The myth of his ride to York, widely current through Ainsworth's *Rookwood*, belongs, if to any one, to 'Swift Nick Nevison,' who in 1676 is said to have robbed a sailor at Gadshill at 4 A.M., and to have established an 'alibi' by reaching York at 7.45 P.M. that same evening.

Turquoise (i.e. 'the Turkish stone;' spelt also *turkis*, as by Tennyson, and *turqueis*), an ornamental stone, essentially a phosphate of alumina, but containing also a little oxide of iron and oxide of copper. It is harder than felspar, but softer than quartz, and has a greenish-blue colour, and occurs as thin veins in slate rock. It is opaque, or sometimes translucent at the edges. The true oriental turquoise is found only near Nishapur in the Persian province of Khorassan. Old mines no longer worked are found in the Sinaitic peninsula; and of late Mexico produces good turquoises. A famous one, which once belonged to Nadir Shah, was two inches long, and was offered for sale at Moscow in the 18th century for £780. The name *Callaite* has been given to turquoise.—Fossil turquoise or *odontolite* is simply the fossil ivory of the Mammoth (q.v.), coloured blue by phosphate of iron, a blue which seldom fades. A mineral very like a greenish turquoise is found in Brittany, and has been named *Variscite*. It is sometimes called Oriental Turquoise; whilst the name Occidental Turquoise is given to a substance of similar colour, found near Simon, in Languedoc, which is said to be merely bone coloured with phosphate of iron.

Turretin, a distinguished family of theologians of Geneva, descended from Francesco Turretini, who emigrated for conscience' sake from Lucca to Geneva in 1579. His son, Benedict Turretin (1588–1631), became pastor at Geneva in 1612 and professor in 1618.—His son, François Turretin (1623–87), laboured at Geneva as pastor to the Italian congregation, and from 1653 as professor of Theology. He took a principal part in originating the Helvetic Consensus, and wrote a meritorious *Institutio Theologiæ Elencticæ* (Gen. 1679–85; 3 vols. Edin. 1847–48).—His son, Jean Alphonse, often called Turretin the Younger, and by far the greatest of the name, was born in Geneva in 1674. He studied theology there under Tronchin, visited Leyden, next both Oxford and Cambridge, and on his return became pastor of the Italian congregation, in 1697 professor of Church History, in 1705 of Theology. Throughout life he laboured to promote a union of the Reformed and Lutheran Churches (the aim of his *Nubes Testium*, 1729), and succeeded in abolishing the Helvetic Consensus in 1725. His famous large-minded *Discourse concerning the Fundamental Articles in Religion* was translated at London so early as 1720. He died at Geneva, May 1, 1737, in which year was published his *Cogitationes et Dissertationes Theologicæ* (2 vols.). See the biographical study by E. de Budé (Lausanne, 1880).

Turret Ship. See Navy.

Turtle (a corruption of *tortoise*, or of the Spanish *tortuga*, 'a tortoise'), any tortoise, but especially the edible Green Turtle (see Tortoise), prized for the soup made from its flesh, chief glory of aldermanic banquets. *Calipash* is the part of the animal that belongs to the upper shield, a fatty gelatinous substance of a dull greenish colour; *calipee*, the yellowish meat of the lower shield. 'Mock Turtle' is made of calf's head in lieu of turtle meat.

Turtle-dove (*Turtur*), a genus of Columbidæ, of graceful build, with small head and slender bill, long wings, and long rounded tail. The genus includes about thirty species, all of which are confined to the eastern hemisphere. The Common Turtle-dove (*T. vulgaris*) is abundant all the year round in the warmer parts of Europe and Asia, but is only a summer visitor in the colder parts. It is found in the south-eastern counties of England during the summer months, and occasionally further north, or even in the south of Scotland. The nest, a very rough loose structure of twigs, is placed on a branch or fork of a tree at no great distance from the ground. Two eggs are laid at a time, and several broods are reared in a season, the male taking an active share in the work of hatching and rearing the young. The food of the turtle-dove consists chiefly of seeds, and in some districts the number of birds present in a season is said to depend on the quantity of pine seeds. The turtle-dove is timid and cautious in its habits, and is effectively protected from birds of prey by its power of flying swiftly and almost noiselessly in and out among the trees even in the thickest part of a forest. Its plumage, though not so brilliant as that of the true pigeons, is very beautiful, the various tints of reddish-brown and gray shading softly into each other; the head and neck are blue, the tail-feathers tipped with white. Their beauty of form and colour, their soft cooing, and their affection towards each other and their young have made this

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and other species of turtle-dove favourite cage-birds. They are easily tamed, breed readily in captivity, and have been known to live as long as fourteen years. *Turtur risorius*, called sometimes turtle-dove and sometimes ring-dove, is of a pale creamy colour, with a black half-ring round the nape of its neck. See PIGEON.

Tuscaloosa, once the capital of Alabama, 55 miles by rail SW. of Birmingham, is the seat of the state university and insane asylum, and has two women's colleges. Pop. 2500.

Tuscan Order, in Architecture, the simplest of the five classic orders, being a Roman modification of the Doric style with unfluted columns, and without triglyphs. See COLUMN.

Tuscany, formerly a sovereign grand-duchy in the west of Italy, lying for the most part, but not wholly, south and west of the Apennines, with an area of 9291 sq. m. Pop. (1860) 1,800,000; (1881) 2,208,869; (1890) 2,274,191. The north and north-east of the country is filled with mountains, whence numerous rivers and streams flow down to the sea, the most important of which is the Arno. This district is also the source of the Tiber (q.v.). The rest of Tuscany is an undulating region of hills and dales, except the coasts, which are flat and marshy (see MAREMMA). For the eight provinces of Tuscany, as a *compartimento* of the kingdom, see ITALY. Its ancient history is described at length in the article ETRURIA, and its mediæval history in the article FLORENCE (cf. also ITALY). It is only necessary to add that modern Tuscany was first constituted in its present dimensions in 1569, when Cosimo de' Medici became Grand-duke. On August 16, 1860, the national assembly of Tuscany pronounced the deposition of the reigning dynasty, and declared for annexation to Sardinia; and in February 1861 it was declared part of the new kingdom of Italy.

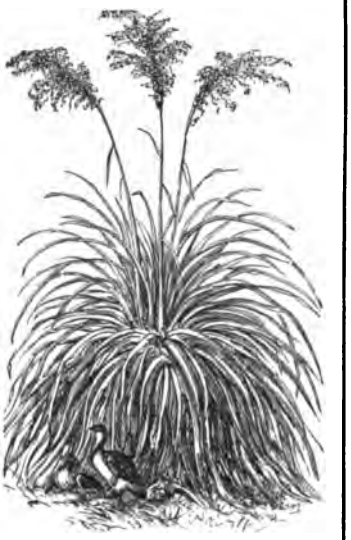
Tuscaroras, a tribe of Indians who were driven out of North Carolina by the settlers in 1715, and joined the Iroquois (q.v.).

Tusculum, anciently a city of Latium, about 15 miles S. of Rome, was situated on a ridge of hills known as the *Colles Tusculani*, and forming part of the Alban range. Octavius Mamilius, ruler of Tusculum, married a daughter of Tarquinius Superbus, and played a conspicuous part in the last of the great struggles made by the banished tyrant to regain his kingdom. But the Latins were so thoroughly beaten at Lake Regillus (496 B.C.) that they were fain to enter into an alliance with the victor, and ever after, except in the Great Latin War (340–338 B.C.), remained steady in their fidelity to Rome. As early as 378 B.C. the inhabitants of Tusculum received the Roman franchise. Towards the close of the Republic Tusculum became a favourite country residence of the wealthy Romans; Lucullus, Cato, Brutus, Hortensius, Crassus, Cæsar, and Cicero had villas here. The great orator here composed many of his philosophical works, and particularly his charming *Tusculanæ Disputationes*. Till 1191 Tusculum continued entire; but it was stormed then by the Romans and ruined for ever; lower down there arose the town of Frascati (q.v.). Many fine remains of ancient Tusculum have been dug up, the most remarkable being the amphitheatre, theatre, and city walls.

Tusk. See TORSK.

Tuskar Rock, 7 miles NE. of Carnsore Point, on the coast of Wexford, has a lighthouse 110 feet high, with a light visible for 15 miles.

Tussac Grass (*Dactylis cæspitosa*; syns. *Festuca cæspitosa, F. antarctica, F. flabellata*), a large grass of the same genus with the Cock's-foot Grass of Britain, a native of the Falkland Islands, remarkable for forming great tufts, sometimes 5 or 6 feet in height, the long tapering leaves hanging over in graceful curves, from 5 to 8 feet long, and an inch broad at the base. It is, however, sufficiently delicate to be very good food for horses and cattle; and it has been tried with success in the Hebrides, Orkney Islands, and other localities in which there is a peaty soil exposed to winds loaded with sea-spray. The inner part of the stem a little above the root is soft, crisp, flavoured like a hazel-nut, and often eaten by the inhabitants of the Falkland Islands. The young shoots are boiled and eaten as asparagus.



Tussac Grass (*Dactylis cæspitosa*).

Tussaud, MADAME, the foundress of the well-known exhibition of wax-work in London, was born (Marie Grosholtz) at Berne in 1760, and learned the art of modelling in wax in Paris. For a time she was engaged in giving lessons in modelling to Elizabeth, sister of Louis XVI., and in this way became acquainted with the leading personages at court. Imprisoned for three months during the Revolution, in 1802 she established herself in London, where she died 16th April 1850. The collection of upwards of 300 portrait figures (that of Voltaire and others still on view modelled by Madame Tussaud herself from life), with the 'Chamber of Horrors,' devoted to figures of murderers, instruments of torture, the guillotine of the Revolution, &c., is one of the sights of London. See the Life by Hayley (1878).

Tusser, THOMAS, in Fuller's phrase, 'successively a musician, schoolmaster, serving-man, husbandman, grazier, poet, more skilful in all than thriving in any vocation,' was born at Rivenhall in Essex about 1527. After serving as a chorister in the chapel of Wallingford Castle, and at St Paul's, he went to Eton, where he was whipped by Udall, was elected in 1543 to a scholarship at King's College, Cambridge, but soon afterwards removed to Trinity Hall, where he tells us that he dwelt trimly and passed his time joyfully with a number of learned men. After a residence at court as a retainer of Lord Paget, he married and settled as a farmer at Cattiwade, near East Berghott, in Suffolk, where he compiled his famous work, *A Hundreth Good Pointes of Husbandrie* (1557). Quarrelling with his landlord, Tusser left his farm, and became a lay clerk in Norwich Cathedral, which post he again gave up for a farmer's life. He died in London about April 1580, and was buried in the church of St Mildred in the Poultry. Tottel published in 1573 an edition of his book enlarged into *Five Hundreth Pointes of Good Husbandrie*, with a curious metrical autobiography. Warton says well that this old English Georgic has much more of

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the simplicity of Hesiod than of the elegance of Virgil, still it reflects in a pleasing manner the simpler virtues of the good old times.

Editions are by Dr W. Mavor (1812), Mr Arber (1873), and the English Dialect Society (1879).

Tussila'go, a genus of plants of the natural order Compositæ, sub-order Corymbiferæ. *T. farfara*, sometimes called Colt's-foot, is the only British species. It has single-flowered scaly scapes, appearing before the leaves in early spring, the flowers yellow, both disc and ray; the leaves heart-shaped, angular, downy beneath. The leaves have a somewhat glutinous and subacrid taste, and are used either by smoking or in the form of a decoction for relief of asthmas and troublesome coughs. They are clothed on the under side with cottony down, formerly used as tinder. The feathery pappus-hair which succeeds the flowers is eagerly sought by goldfinches to line their nests. Nearly allied to this genus is Petasites, of which one species, the Butter Bur (*P. vulgaris*, formerly *T. petasites*), is a native of Britain. The leaves resemble those of *T. farfara*, but are much larger; the flowers also appear before the leaves, but in a dense thyrsus, and are of a pale flesh colour. The flowers of both are much sought after by bees, as are those of *P. alba* and *P.* (both formerly *T.*) *fragrans*, natives of the south of Europe, not uncommon in British flower-gardens.

Colt's-foot (*Tussilago farfara*).

Tussock Moth (*Dasychira pudibunda*), a grayish-white moth about an inch long, the caterpillars of which do great mischief in hop grounds, and are known as *Hop-dogs*. The caterpillar is delicate green in colour, with brush-like tufts of yellow hairs on several of the segments. It feeds on leaves throughout the summer, becomes a hairy chrysalis about September, and emerges as a moth in the following spring. Miss Ormerod recommends a hard syringing if the caterpillars are present in large numbers.

Tussock Moth and Caterpillar.

Tutbury, in Staffordshire, on the river Dove, 6 miles by rail NW. of Burton-on-Trent, with the ruins of the pre-Norman castle where Mary Queen of Scots was twice imprisoned. Pop. 2306.

Tuticorin (*Tuttukudu*), a port at the south-east corner of India, 35 miles E. of Tinnevelly by rail, with pearl-fisheries and Catholic missions. Pop. 11,000.

Tutor, in the law of Scotland, means a guardian of the person as well as of the estate of a boy under fourteen, or a girl under twelve: that is, while they are in a state under that of puberty. See GUARDIAN, INFANT.

Tuttlingen, a town of Würtemberg, on the Danube, 20 miles WSW. of Sigmaringen. It has manufactures of boots, knives, &c. Here on 24th November 1643 an Austro-Bavarian force defeated the French. Pop. 8659.

Tver, capital of a Russian government at the confluence of the Volga and Tvertsa, 100 miles NW. of Moscow by rail. There are manufactures of cottons, hosiery, and nails. Pop. (1890) 39,280.

Twain, MARK. See CLEMENS, S. L.

Tweed, the noblest of Scottish rivers, rises far up in Peeblesshire at Tweed's Well, 1500 feet above sea-level, and flows 97 miles north-eastward, eastward, and again north-eastward, through or along the boundaries of Peeblesshire, Selkirkshire, Roxburghshire, Berwickshire, and Northumberland, till it falls into the German Ocean at Berwick-on-Tweed. It receives Gala Water, Ettrick Water (itself fed by Yarrow), the Leader, the Teviot, the Till, the Whitadder, and a number of lesser tributaries; is tidal for 10 miles, but almost quite unnavigable; and traces the English border for only 18½ miles, so that 'North of the Tweed' is a none too accurate phrase. It is famous for its salmon-fisheries, but more famous far for its memories: 'which of the world's streams,' asks George Borrow, 'can Tweed envy, with its beauty and renown?' For it flows by Neidpath, Peebles, Traquair, Ashiesteel, Abbotsford, Melrose, the Eildons, Bemersyde, Dryburgh, Kelso, Coldstream, and Norham Castle; nor are these a tithe of Tweedside's historic scenes. Merlin, Thomas of Ercildoune, and Michael Scott—the Tweed has dim legends of these; and its ripple was the last sound heard by a fourth and a mightier wizard than them all, Sir Walter.

See BORDERS; Sir Thomas Dick Lauder's *Scottish Rivers* (new ed. 1890); and Veitch's *River Tweed* (1884).

Tweed, 'BOSS.' See TAMMANY SOCIETY.

Tweedmouth. See BERWICK-ON-TWEED.

Tweeds. See WOOL.

Twelfth-day, the twelfth day after Christmas, the feast of the Epiphany (q.v.), was once a time of great popular festivities, originally designed to honour the Three Kings (see MAGI). One of the chief features was the choosing of a king of the feast by means of a bean hidden in the *Twelfth Cake*. When on the eve of the feast this cake was cut up and distributed, the person in whose portion the bean was found was king—hence called Bean-king. This choosing of a king by means of a bean was in use at some other festivals also.

Twelve Patriarchs, TESTAMENTS OF THE, a work of the 2d century after Christ, in which, on the model of Jacob's blessing of the tribes in Genesis xlix., discourses and prophecies of Christ are put into the mouths of the fathers of Israel. There are monographs on it by Vorstmann (1867), Sinker (1879), and Schnapp (1884).

Twelve Tables (Lat. *Lex Duodecim Tabularum*), the name given to the earliest code of Roman law, civil, criminal, and religious, made by the decemvirs in 451–449 B.C. (A.U.C. 302–304). These, originally comprised in ten tables, to which next year two others were added, were supposed to form the basis of all Roman law, and in Cicero's time were still committed to heart by boys at school. But they were very far from being a complete system. The occasion for them arose in the constant complaints made by plebeians of oppression by patricians; and the principal aim of the twelve tables

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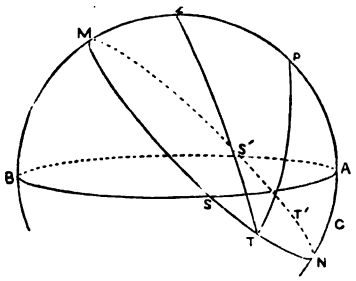
was to define rights, fix penalties, and prevent oppression under legal forms. Some of them were based on Greek models; most of them were derived from earlier Roman legislation. But laws about which there was no dispute were not included; thus they did not deal with the family, the succession, or ordinary legal procedure, and contained little of customary law. Many older laws were left intact by them, and reappear in Justinian's code. To the original tables commentaries were from time to time added. It is probable that the original bronze tablets on which the laws were written perished in the sack of Rome by the Gauls in 390 B.C.; copies of them stood in the forum in the 2d century A.D. Of the text we possess only fragments edited by Schöll (1866), Voigt (1884), and Godefroy; see also Wordsworth's *Fragments* (1874), Ortolan's *History of Roman Law* (trans. 1871), and Muirhead's *Historical Introduction* (1886).

Twickenham, a town of Middlesex, on the north bank of the Thames, 11½ miles SW. of London. It is a place of many villas, and has been the residence of many notabilities—Catharine of Aragon, Lord Bacon, Lord Clarendon, Pope (who is buried in the church), Horace Walpole (Strawberry Hill still remains, although a good deal altered), Kitty Clive, several of the Orleans family, J. M. W. Turner, Lord Tennyson, &c. Pop. (1851) 6254; (1891) 16,026. See R. S. Cobbett's *Memorials of Twickenham* (1872).

Twilight. If the earth had no atmosphere we should be involved in total darkness from the instant of sunset till the instant of sunrise. The transition from day to night, and from night to day, occupies an interval which varies with the latitude and the declination of the sun, and this intermediate stage is called twilight. As long as the sun is not more than 18° below the horizon its light is reflected by the air and the clouds and vapour suspended in it in sufficient quantity to render even distant objects visible. The question of the duration of twilight is, therefore, simply reduced to this: How long after sunset, or before sunrise, does the sun reach a position 18° below the horizon of a given place? And this can be answered easily by calculation in spherical trigonometry. Thus, if Z be the zenith, P the pole of the



heavens, ASB the horizon, and MSTN the (small) circle which the sun describes about the pole; there is twilight while the sun moves from T to S, ZT being an arc of 108°. In the spherical triangle ZPT, we know the three sides, for ZP is the colatitude of the place, PT the sun's polar distance, and ZT is 108°. Hence we can calculate the angle ZPT, which is the sun's *hour-angle*; and from this we find at once how long before or after noon the sun passes the point T. If ZT′ be also 108°, we see that it is night while the sun moves from T′ to T, day while it moves from S (through M, its meridian position) to S′, morning twilight from T to S, and evening twilight from S′ to T′. Make ZC = 108°, then, if PN be less than PC, but greater than PA, there will be no point of the sun's path (MS′NS) so far as 108° from Z; and therefore the points T and T′ will not exist. In this case the sun will set and rise, but there will be *no night*, or, rather, twilight will occupy the whole interval from sunset to sunrise. This cannot occur in low latitudes, but does occur during certain periods of the year in northern and southern countries. For

PN is 90° − sun's declination,
PC is latitude + 18°,

and our condition is, therefore, that 90° − sun's declination, while greater than the latitude, does not exceed it by more than 18°. Or, in a simpler form, the latitude, together with the sun's declination, must lie between 90° and 72°. Now the sun's greatest declination is about 23° 30′, and therefore in lat. 48° 30′ (72° − 23° 30′) there will be one night in the year (at the summer solstice) consisting wholly of twilight; for higher latitudes, more; and for lower, not one.

Twill, a woven fabric, in which the warp is raised one thread, and depressed two or more threads for the passage of the weft: this gives twill a curious appearance of diagonal lines.

Twining, THOMAS, translator of Aristotle's *Poetics*, was born the son of a prosperous tea-merchant in 1734, but, preferring study to business, entered Sidney Sussex College, Cambridge, and graduated B.A. in 1760. He took orders, and became in 1768 rector of White Notley in Essex, in 1770 also of St Mary's, Colchester. A pious and scholarly man, of wide reading and good critical powers, he discharged his clerical duties with zealous honesty, finding his solace in music, letter-writing, and travelling over England, and died, after a well-spent life, 6th August 1804. His translation of the *Poetics* of Aristotle—a sound piece of scholarship—appeared in 1789. His great-nephew published in 1883 a selection from his correspondence under the title *Recreations and Studies of a Country Clergyman of the 18th Century*. Its success induced a further book, the much less interesting *Selections from Papers of the Twining Family* (1887), the chief contributor in which is not the clergyman, but his brother, Richard Twining, head of the tea-business.

Twinkling. See SCINTILLATION.

Twiss, SIR TRAVERS, jurist, was born in Westminster, 19th March 1809, and was educated at University College, Oxford. Successively fellow and tutor of his college, a public examiner at Oxford, professor of Political Economy at Oxford (1842-47), and of International Law in King's College, London (1852-55), he became in 1855 professor of Civil Law at Oxford. In 1858 he became Chancellor of the Diocese of London, in 1862 Advocate-general of the Admiralty, Queen's Advocate-general in 1867, being knighted that same year. He served also on various royal commissions. He resigned all his offices in 1872, but thereafter in 1884 drew up for the Belgian King Leopold II. a constitution for the Congo Free State, and in 1885 acted as legal adviser to the West African Conference at Berlin. His writings are masterly alike in erudition and perspicacity, and rank admittedly among the most authoritative on questions of public and international law. Among the most important are *View of the Progress of Political Economy since the 16th Century* (1847), *Lectures on International Law* (1856), *The Law of Nations* (1861), *Law of Nations in Times of War* (1863), *Monumenta Juridica: The Black Book of the Admiralty* (4 vols. 1871-76), an edition for the Rolls series of the *De Legibus et Consuetudinibus Angliæ* of Henry de Bracton (6 vols. 1878-83), and *Belligerent Right on the High Seas* (1884).

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Tyburn. See LONDON, p. 705, and EXECUTION.

Tye, CHRISTOPHER, English musician, was born at Westminster about 1500, was educated in the King's Chapel, and was musical instructor to Edward VI. He received his Mus. Doc. from Cambridge in 1545, from Oxford in 1548. Under Elizabeth he was organist to the Chapel Royal, and produced various fine services and anthems.

Tyldesley, a town of Lancashire, 10 miles NW. of Manchester, with cotton-mills and collieries. Pop. with Shakerley (1881), 9953; (1891) 12,891.

Tyler, JOHN, tenth president of the United States, was born in Charles City county, Virginia, March 29, 1790, graduated at William and Mary College in 1807, and two years later was admitted to the bar. He sat in the state legislature from 1811 till 1816, when he was chosen to fill a vacancy in congress. He was returned in 1817, and again in 1819, and distinguished himself as a strict constructionist, opposed protection, and, on the Missouri question, denied the right of congress to limit the extension of slavery, or to control it at all in the territories. In 1825–26 he was elected governor of Virginia, and in December 1826 a United States senator—partly by the votes of Clay's supporters; but in the senate he pursued an independent course, and, while in 1832 he supported Jackson rather than Clay for the presidency, in February 1833 he was the only senator who recorded his vote against the 'force bill' granting extraordinary powers to the president in dealing with South Carolina (see JACKSON). And yet Tyler disapproved of Nullification (q.v.); only he disapproved still more of arbitrary and unconstitutional action on the part of the federal executive. This motive accounts for his action also in the case of the United States Bank (see JACKSON). He had denounced its existence from his first entrance on a public career; but he resented the despotic methods by which Jackson overthrew it, and he supported Clay's motion to censure the president, and, declining to obey instructions to vote for expunging this motion from the minutes, in 1836 resigned his seat. In 1840 he was elected vice-president of the United States, with General Harrison as president. President Harrison died April 4, 1841, a month after his inauguration, and by this event Tyler became president. In the first year of his administration he had to face a struggle with the Whig majority in congress and the senate, headed by Clay, who regarded the result of the election as a victory for them and for the project of a re-established national bank. Two bills were passed to this end, and both, in spite of the storm raised, were vetoed by the president. After the second veto, in September 1841, all his cabinet except Daniel Webster resigned; and Webster followed the rest in 1843, his place being taken in 1844 by John C. Calhoun. But victory lay with the president, whose firmness utterly and finally destroyed the project, and with it the notion of paternal government. In 1842 he vetoed two protective bills providing for a distribution of the surplus revenues among the states. Besides the Ashburton (q.v.) treaty, the most important act of his administration was the annexation of Texas, in March 1845. At the close of his term of office he retired to Virginia and to private life until 1861, when he was president of a peace convention at Washington. Failing in his efforts at a compromise, he gave his adhesion to the Confederate cause, and was a member of the Confederate congress until his death, at Richmond, January 18, 1862. See his son's *Letters and Times of the Tylers* (2 vols. Richmond, 1884–85).

Tyler, WAT, leader of the peasant revolt of 1381. According to the traditional story, an insult offered by a tax-gatherer to the daughter of Walter the Tyler (a tiler of roofs) at Dartford in Kent led to the outbreak. Wat brained the tax-gatherer; and under Wat and Jack Straw the populace rose throughout Kent and Essex. Their first act was to liberate John Ball, who lay in Maidstone prison for Wyclifite teaching and seditious utterances, and then they marched on London. The several causes of the rebellion, its brief course, and its swift and summary suppression, with the death of Wat at the hands of Lord Mayor Walworth, are treated at RICHARD II.

Tylor, EDWARD BURNETT, the most philosophical of our anthropologists, was born at Camberwell, 2d October 1832, and had his education at the Friends' school, Grove House, Tottenham. Meeting the ethnologist Mr Henry Christy in Cuba in 1856, he accompanied him on a scientific journey through Mexico, one result of which was his *Anahuac, or Mexico and the Mexicans* (1861). Elected F.R.S. in 1871, he received the degrees of LL.D. from St Andrews in 1873, and D.C.L. from Oxford in 1875, and in 1883 was appointed keeper of the Oxford University Museum, and Reader in Anthropology. He was nominated in 1888 the first Gifford lecturer at Aberdeen, and became president of the Anthropological Society in 1891. His *Researches into the Early History of Mankind* (1865) and *Primitive Culture* (2 vols. 1871; 3d ed. 1891) stand first among works of their class, in learning, arrangement, grasp of principles, and breadth of view. The foundation of his philosophy of man is involved in the new sense which he has given to the word Animism (q.v.). One of the best introductory handbooks to a subject ever written is his *Anthropology* (1881).

Tympanum. See EAR.

Tyndale, WILLIAM, memorable in the history of the English Bible, was born about 1484, and was a native of Gloucestershire, born most probably at Melksham Court in the parish of Stinchcombe, rather than at Hunt's Court, North Nibley. He had his education first at Oxford—at Magdalen Hall, says unvarying tradition—and graduated B.A. in 1512. His name occurs in Boase and Clark's *Register of the University of Oxford* (1884–88) as William Hychyns—a name said to have been assumed by his great-grandfather, and by which at any rate, together with Tyndale's, he is described in official documents. It is probable enough that at Oxford he may have been influenced by the disciples of Colet, who himself lectured here till 1505, and it is still more probable that he was attracted to Cambridge by the fame of Erasmus, who lived there from about 1510 to 1514. He left Cambridge most probably about the close of 1521 to become chaplain and tutor in the household of Sir John Walsh of Little Sodbury in Gloucestershire. His sympathy with the new learning soon aroused suspicion, and in 1523 he went up to London, where he was hospitably entertained in the house of Humphry Monmouth. He was already a competent Greek scholar, and in his unsuccessful application to Tunstall, Bishop of London, he carried with him a translation of part of Isocrates as a recommendation. In the spring of 1524 he went to Hamburg, probably made his way thence to Wittenberg, next in the autumn of 1525 to Cologne, and there, with the help of a Franciscan friar named William Roye, and another, began with Quentel in 1525 the printing of his English New Testament in an impression of 3000 copies in quarto size. This had not proceeded beyond the gospels of Matthew and Mark when the officious intrigues of Cochlæus forced Tyndale to flee to Worms, where, instead of completing Quentel's unfinished work, Peter Schoeffer printed for him another impression of

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3000 copies in a small octavo size, without prefaces to the books or annotations in the margin. The quarto was completed soon after, most probably also by Schoeffer, with general introduction, prologues, inner marginal references, and outer marginal glosses, these last largely taken from Luther's version of 1522, the references especially being faithfully copied in many cases even to the errors. The translation itself owed much to Luther, much also to the 3d ed. (1522) of the Greek Testament of Erasmus with its Latin translation. Tunstall and Warham denounced the book, hundreds of copies were bought up and burned by their authority, but in both forms it made its way by the summer of 1526 to the hearts of Englishmen, and the strong simplicity and homely vigour of its style established a standard of biblical translation into English, and bequeathed its phrases imperishable to all posterity. By 1530 as many as six editions, of which three were surreptitiously printed at Antwerp, had swiftly and silently been dispersed, yet, says Westcott, so fierce and systematic was the persecution that of these six editions, numbering perhaps 15,000 copies, there remains of the first quarto fragment but one copy, and that imperfect (Grenville Library, Brit. Mus.; photo-lithographed by Mr Arber, 1871), of the first octavo but two, one incomplete (in St Paul's Cathedral Library), the other wanting only the title-page (in Baptist College, Bristol; fac-simile by Mr Francis Fry, 1862), and of the others but two or three copies, and these not satisfactorily identified.

Meantime Tyndale continued to toil indefatigably at the labour of his life. In 1530 he published at Malborow (Marburg) by Hans Luft his version of the *Pentateuch* (reprinted by Rev. Dr J. I. Mombert, 1885), where the marginal glosses, almost all original, contain many violent attacks on the pope and the bishops, full of rich satire, irony, and even humour. It is scarcely possible, *pace* Dr Mombert, that Tyndale could have found time to master Hebrew very thoroughly, and we find that here, still more than in his New Testament, he leans heavily on Luther. Later, in 1531, appeared his version of *Jonah*, with a prologue (fac-simile by Mr Fry, 1863). An unauthorised revision of Tyndale's New Testament was made at Antwerp by George Joye in August 1534, and in November of the same year Tyndale himself issued there at the press of Marten Emperowr a revised version with short marginal notes and prologues, together with a translation of the 'Epistles taken out of the Old Testament which are read in the church after the Use of Salisbury upon certain days of the year.' These include a large number of portions from the Old Testament and the Apocrypha. One copy of this work, probably that preserved in the British Museum, was struck off on vellum and beautifully illuminated for presentation to Queen Anne Boleyn, under whose favour apparently was printed in 1536 by T. Godfray a reprint of Tyndale's revised New Testament—the first volume of Holy Scripture printed in England. Once again before the end Tyndale revised his Testament (1535), this time without the marginal notes, but with the innovation of headings to the Gospels and Acts, but not the Epistles. Another point of difference was a peculiarity of orthography (*maester*, *faether*, *moether*, *stoene*, *moost*, &c., 200 in all), long suspected erroneously to have been an attempt to supply provincial forms for English rustics, but more probably, as Mr Demaus, Bishop Westcott, and Mr Ellis believe, due to the copy being read to a Flemish compositor, who gave the Flemish equivalents of the English vowel-sounds.

But now it wanted only the crown of martyrdom to consecrate the lifelong devotion of Tyndale to his task. Already the emissaries of Henry VIII. had often tried to get hold of him, or at least to discover his hiding-place. He had spent two quiet years of constant labour at Antwerp, part of the time in the house of Thomas Poyntz, when he was seized through the treachery of one Henry Philips, 24th May 1535, 'not without the help and procurement of some bishops of this realm' says Hall. For sixteen months he lay in the castle of Vilvorde, and it appears that Cromwell made some ineffectual efforts to save him. A single letter in Latin, discovered by M. Galesloot in the archives of the Council of Brabant, is reproduced in fac-simile by Mr Demaus, and gives a touching picture of the noble martyr sitting through the long winter nights in the cold and darkness of his dungeon, and asking above all things for a lamp and his Hebrew Bible, Grammar, and Dictionary. It is highly probable that his prayer was granted, and that before the end he had completed, according to unvarying tradition, the translation of the Old Testament to the end of the Books of Chronicles. This part of his work was printed by John Rogers, along with Tyndale's Pentateuch and New Testament, in what is usually known as Matthews' Bible. Tyndale's protracted trial was apparently not begun till 1536; on Friday the 6th October of that year he was first strangled, then burned. Foxe tells us that at the stake he cried 'Lord, open the king of England's eyes!' Eight years before he had written, 'If they shall burn me, they shall do none other thing than that I look for. . . . There is none other way into the kingdom of life than through persecution and suffering of pain, and of very death, after the ensample of Christ.'

Tyndale's chief original works were *A Parable of the Wicked Mammon* (1527); *Obedience of a Christian Man*, his most elaborate book (1528); and *Practice of Prelates* (1530), a pungent piece of controversial polemic, called forth by Sir Thomas More's *Dialogue* (1529), which he met formally with his plain and pointed *Answer* (1531). More followed next year with the first part of his long and intemperate *Confutation*, a work unworthy of its author's reputation. Tyndale's *Works* were published, together with those of his dear friend Frith, and Barnes, in folio by John Daye in 1573. His *Doctrinal Treatises and Introductions to Different Portions of the Holy Scripture* were published by the Parker Society in 1848; his *Expositions and Notes on the Holy Scriptures, together with the Practice of Prelates*, in 1849, and the *Answer to More's Dialogue* in 1850. It was fortunate for our literature that the task of translating the Bible fell to a writer with such a splendid sense of English as William Tyndale. He gave to his work an independent and ineffaceable stamp of originality, and, if later revisers of greater learning have amended his renderings, the characteristic language of the English Bible remains his own. See the admirable biography by the Rev. R. Demaus, revised ed. by Richard Lovett (1886); also Westcott's *General View of the History of the English Bible* (2d ed. 1872), and Francis Fry's *Bibliographical Description* of forty editions of Tyndale's version in English (1878).

Tyndall, JOHN, physicist, was born 21st August 1820 at Leighlin-Bridge, County Carlow, was employed for a time on the ordnance survey, and for three years was a railway engineer at Manchester. In 1847 he became teacher of physics at Queenwood College, Hampshire, where he began original researches. In 1848 he and his colleague, Dr Frankland, went to Germany and studied at Marburg (under Bunsen); and there, at Berlin, and elsewhere he made investigations into diamagnetism and the magneto-optic properties of crystals. Already an F.R.S., he was in 1853 made professor to the Royal Institution, of which in 1867 he became superintendent. In 1856 Professor Huxley and he made a visit to the Alps, which resulted in a joint work on the structure and motion of glaciers. Tyndall was the first who ever climbed the Weisshorn. In 1859 he began his important

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researches on radiation; a later subject was the acoustic properties of the atmosphere. In 1874 he was president of the British Association at Belfast, and by the materialist tone of his presidential address raised keen and long-lasting controversies. He was for some years scientific adviser to the Board of Trade and to the light-house authorities, but in 1883 retired from most of his appointments and established himself in the country (in Sussex). He has been especially famous as a brilliant and effective lecturer, and as a popular exponent of modern physical science. The proceeds of a successful lecturing tour in the United States (1872) he devoted to founding scholarships at Harvard and Columbia colleges for students giving themselves to original research. Among his honours are the LL.D. of Edinburgh and Cambridge, and the D.C.L. of Oxford.

His works comprise *The Glaciers of the Alps* (1860); *Mountaineering* (1861); *Heat as a Mode of Motion* (1863); *On Radiation* (Rede Lecture, 1865); a volume on Light, one on Sound, one on Electricity, one on Faraday, and one on the forms of water in clouds, rivers, ice, &c.; also *Hours of Exercise in the Alps* (1873); *Fragments of Science* (5th ed. 1876); Essays on the *Floating Matter of the Air* (1881); and *New Fragments* (1892).

Tyne, a northern English river, formed by the confluence of the North Tyne and the South Tyne, a mile NW. of Hexham. It flows east for 30 miles, and enters the sea between Tynemouth and South Shields. Some of the head-streams of the North Tyne rise in Scotland, about 11 miles SE. of Hawick. It flows south across Keelder Moor, and south-east to Hexham, with a total length of 32 miles, and receives on the left the Reed Water near Bellingham. The South Tyne rises on the slopes of Cross Fell, flows 19 miles north to Haltwhistle, then 14 miles east to Hexham, receiving the Allen on the right. The scenery of the two head-streams is beautiful beyond most, and few districts of England, moreover, are richer in romantic and historical associations. The Tyne itself flows through the richest coal-mining region of Britain, and on its banks stand Corbridge, Ovingham, Newburn, Ryton, Blaydon, Newcastle and Gateshead, Walker, Jarrow, North and South Shields. Its chief affluents are the Derwent and the Team on the right. Navigable from Blaydon, about 8 miles above Newcastle, from that city to the sea it is one continuous harbour. The salmon-fisheries have decayed, but the shipbuilding maintains its importance. The multifarious manufactures carried on on Tyneside (which sadly defile the lower course of the stream) may be realised by referring to the article NEWCASTLE, where also the sea-borne trade and the deepening of the river are referred to. For statistical and some other purposes, Newcastle and North and South Shields are grouped together as the 'Tyne ports.' The Tyne is also famous among English rivers for its boat-racing (see ROWING). See Guthrie's *River Tyne* (1880), Palmer's *Tyne and its Tributaries* (1881), and Cassell's *Rivers of England.*

Tynemouth, the chief watering-place of Northumberland, 9 miles E. of Newcastle, occupies the angle formed by the line of the coast and the Tyne. The municipal and parliamentary borough comprises the townships of Tynemouth, North Shields (q.v.), Chirton, Cullercoats, and Preston. From an early period Tynemouth was a place of importance. Edwin, King of Northumbria, is said to have founded here, about 627, a church of wood, wherein his daughter Rosella took the veil. King Oswald rebuilt it of stone about 640, and probably established the monastery, which in the succeeding centuries suffered much from the hands of the Danes. It was refounded in 1090 by Mowbray, Earl of Northumberland. The monastic buildings were dismantled at the dissolution in 1539. The remains of the priory are chiefly those of the church, which was built about 1100 and enlarged about 1220. The chancel, whose eastern and southern walls are still standing, is one of the most exquisitely light and graceful specimens of Early English architecture in the country. The Lady Chapel, a chantry of the Percies, was founded towards the close of the 14th century. Tynemouth castle was built about 1296. All that remains of it now is the great gateway of 14th-century date.

Tynemouth is a clean, healthy town, with several good streets and terraces. A wide road extends to Cullercoats called the Grand Parade. The sands are nearly a mile long, and the Permian cliffs are very picturesque. The aquarium, built 1877–78, is now used for promenade concerts. The pier, over half a mile in length, was built in 1854–92. On the cliff above it is the lighthouse, 62 feet high. A monument to Lord Collingwood, by Lough, was erected in 1845 on Galley Hill. The Tynemouth Life Brigade, formed on the 5th December 1869, was the first volunteer life brigade in the kingdom. The borough sends one member to parliament. Pop. of township (1881) 22,548; (1891) 28,307; of borough (1891) 46,267. See W. S. Gibson's *Monastery of Tynemouth* (2 vols. 1846).

Type, in Chemistry, a chemical compound which represents the composition and structure of many more complex compounds; especially Gerhardt's four types—hydrochloric acid (HCl), water (H_2O), ammonia (NH_3), and marsh-gas (CH_4).

Type, in Theology, specially the foreshadowing in the Old Testament of something realised in the New (the *antitype*). Thus in the New Testament the brazen serpent is a type of Christ (John, iii. 14), and so is the paschal lamb (1 Cor. v. 7). The seeking and finding of types was carried to an arbitrary extreme in the allegorical interpretation (see EXEGESIS, ORIGEN). See Fairbairn, *Typology of Scripture* (1845–47; 6th ed. New York, 1880).

Types (Gr. *typos*, 'an impression' or 'stamp') are pieces of metal, wood, or other material, on one end of which is cast or engraved a character, sign, &c. Provided that black ink and white paper are used, the character printed by the type will be in black, in which case it will be raised or in relief, or in white, when it will be incised or in intaglio, when the surrounding parts will print. The latter kind of letters is only used for decorative purposes. The word 'type' is held to include many characters which are not letters, such as punctuational signs, astronomical signs, ornaments, pieces of borders, musical characters. A necessary complement to types are the spaces which divide words and fill up openings in composed 'forms.'

A fount (see PRINTING) of Roman and Italic comprises no less than 227 different characters or 'sorts,' as they are called. The Roman capitals, including diphthongs, number 28; small capitals, 28; lower case and ligatures, 34; ordinary accents, 21; points and references, 16; figures and £ mark, 11; Italic capitals and diphthongs, 28; lower case and ligatures, 34; ordinary accents, 21; points, 6. *Ligatures* are types cast together, as fi, fl, ffi. Other kinds of types are *logotypes*, or word-types—the letters of a word, an affix or prefix, in frequent use, such as *the*, *and*, *ing*, *com*, which are sometimes cast in one piece in order that they may be picked up by one motion from the cases, instead of being lifted separately. The economy of using logotypes has never been satisfactorily demonstrated. Certain type-composing machines cast whole lines of letters forming a bar, but these are

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not classed as types. Types are short letters (a, e, o), ascenders (which go above the line of the shorts, as b, d, h), or descenders (g, p, y). The sizes of types are designated by different names in respect of their 'body'—i.e. the depth of the 'face' which comes in contact with the ink plus the 'bevel' and 'beard'—or nearly the whole square at the end of the 'shank' on which the 'body' is formed (see fig. 1 in PRINTING); for there may be several sizes of face on one size of body. Below is a list of the number of lines to the foot of the respective bodies as made in metal types, large wooden types being otherwise described:

Canon	18½	Bourgeois	102
Two-line Double Pica	20½	Brevier	111
Two-line Great Primer	25½	Minion	122
Two-line English	32	Emerald	128
Two-line Pica	35	Nonpareil	144
Double Pica	41½	Ruby Nonpareil	162
Paragon	44½	Ruby	166
Great Primer	51½	Pearl	179
English	64	Diamond	204
Pica	72	Gem	222
Small Pica	83	Brilliant	238
Long Primer	89	Semi-nonpareil	288

The figures are not absolutely accurate; a type of the same name may be at one foundry cast slightly larger than at another; but the discrepancy is very minute. Many pages of type are 'leaded,' have spaces or leads between the lines, and to such this table will not apply, unless the width of the lead is known. The present page is 'solid,' not 'leaded,' and the body of the type can be readily identified. In America types are designated according to the number of 'points' of which the body consists. The point is $\frac{1}{72}$ of a Pica; Nonpareil would accordingly be called six points. On the continent of Europe the point is $\frac{1}{72}$ of a Cicero, a body between Pica and English. The following specimen lines show the usual bodies used in the text of books and newspapers; (1) being set in English, (2) in Pica, (3) in Small Pica, (4) in Long Primer, (5) in Bourgeois, (6) in Brevier, (7) in Minion, (8) in Nonpareil, and (9) in Pearl.

(1) Chambers's Encyclopædia.

(2) Chambers's Encyclopædia.

(3) Chambers's Encyclopædia.

(4) Chambers's Encyclopædia.

(5) Chambers's Encyclopædia.

(6) Chambers's Encyclopædia.

(7) Chambers's Encyclopædia.

(8) Chambers's Encyclopædia.

(9) Chambers's Encyclopædia.

Types vary greatly in *width*; indeed in a complete fount, including spaces, &c., there are no less than 190 different widths or thicknesses between f, i, j, l and m and w. These widths are arbitrary, and in some cases are the result of accident. To meet the requirements of newspaper printing several letters have been made broader of recent years, as may be seen from the *Times*, in which some ordinarily thin letters have a larger proportion of space at the side than the others.

Type-metal is composed of tin, antimony, copper, and lead; for average purposes the proportion may be given as lead, 100 lb.; antimony, 35 lb.; tin, 15 lb.; copper, 4 lb. But type-founders have certain secrets jealously guarded. The antimony gives hardness (and brittleness); and as it expands on solidifying in the mould, ensures sharp faces. Tin gives toughness and makes the metal flow more easily. Copper slightly hardens and toughens. Old type, stereotype, &c. are sometimes utilised, but are rather adulterants. The faces of types are sometimes electroplated with copper, nickel, &c. For resisting great tear and wear brass types are made to a limited extent, both for letterpress printing (labels, advertisements, &c.) and for bookbinders' 'blocking' work. Large wooden types, which are cheaper, lighter, and not so easily fractured by a fall, are cut or engraved either by hand or by a machine which combines the principles of a Pantagraph (q.v.) and an engraver's 'routing' machine.

Various substitutes for type-metal have been proposed, mainly by non-practical inventors—potter's clay, moulded wood, paper pulp, sawdust, glass. Vulcanised rubber has been largely used (since 1868) for making the upper face of single letters and of small casts to be used as stamps. The letters of Type-writers (q.v.) are generally of india-rubber. And for large letters an elastic surface has been used which has glue for its chief ingredient.

In type-founding there are five principal processes—(1) cutting the punch, (2) sinking and adjusting the matrix, (3) compounding the type-metal, (4) casting the type, (5) finishing and dressing the type. A well-tempered steel punch is engraved with the design of the character in relief. This is next struck or punched into a piece of soft metal—finely-burnished copper; a separate piece being required for each character, which, when finished and justified, becomes the matrix. A cheaper kind of matrices is made from ordinary type or specially engraved type by a process of electrotyping. In founding the matrix is fitted to the mould, an ingenious mechanism in two parts, each constructed of several pieces of steel screwed together and fitting closely everywhere except in the centre, where an opening remains of sufficient extent to form the body of the type. The hand-mould, as distinguished from the machine-mould, is further enclosed in a wooden box to save the workman's hand from injury. Attached to the mould is a spring to hold the matrix in position. A spoonful of molten metal is quickly poured into the opening of the mould, which receives at the same time an upward jerk or throw, the matrix removed, the mould opened, and the newly-cast type pulled out.

In 1838 David Bruce of New York invented the type-casting machine which has revolutionised the art of type-founding. By the hand-casting process from 2000 to 3000 ordinary body types was considered a good day's work; by the machine the quantity produced is increased at least fourfold, the method of casting is also much simplified and the labour of the caster rendered less arduous. In place of the many motions necessary in hand-casting, the simple turning of a crank-handle produces a letter in a marvellously short space of time. The mould for the machine has, however, undergone little change beyond being adapted to a new position in the apparatus. In 1862 J. R. Johnson and J. S. Atkinson of London patented a machine in which all operations subsequent to punch-cutting and matrix-justifying were performed automatically; and this was afterwards improved by Mr P. M. Shanks.

Styles of Types.—The earliest books were printed with types resembling the styles for book-writing then popular in the middle of the 15th century. Pointed Black Letter (q.v.) was preferred for church service-books; but for books for the laity a simpler form of black letter was preferred (*lettre de somme*, semi-Gothic, or better, pointed Gothic). Neither form was popular in Germany, and in 1486 Rewich took the departure which led to the German character in which most German printing is still done. The first printers of Italy, themselves Germans, Sweinheym and Pannartz (1465-73),

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began works with new types of the Roman form, but with many features of the black letter. In 1467 a rival German printer, Hahn, began printing in another Roman letter, which also showed a preference for the Gothic form. The first really good form of Roman, adopted everywhere to the suppression of all others, was made by Jenson of Venice, and shown in his *Eusebius* of 1470. Accepted by the educated, it was, however, rejected by the common people, who were just beginning to buy books; and Jenson had to print popular books in Gothic characters; and the most beautiful contemporary books of Paris, the Netherlands, and England were in pointed letters. The first book printed in England in Roman type was Henry VIII.'s treatise which secured for him the title of 'Defender of the Faith;' so printed by Pynson possibly in deference to Italian taste and in compliment to the pope. Aldus Manutius (see ALDINE EDITIONS) added a new style, the Italic, based on a written style then popular with copyists. The Italic, first shown in the 1501 *Virgil*, differed from modern Italic in several respects, notably in the fact that the capitals are upright and stand apart from the text. Aldus's Italic and others imitated from it was soon found to be less readable than Jenson's Roman, and was relegated to the work of a 'display letter'—to distinguishing foreign or emphatic words in a sentence (even for this purpose its use is now diminishing).

The Lyons founders, moved by the popularity of Italic, soon after produced the Cursiv-François or Civilité, an unreadable letter. The disuse of black letter in France was largely due to the fantastic schemes of Tory of Paris, as illustrated in his book, *Champ Fleuri* (1526). The patronage of Francis I. led to the beginning of the great printing house which, as 'Royal,' 'Imperial,' or 'National,' has survived till now, and in its school of typography most great French punch-cutters, including Garamond, 'the father of type-founders,' were trained. In 1561 Le Bé's foundry was most famous, and made the types for Plantin's Antwerp Polyglot (1573). The most notable Dutch founders were Van Dijck, whose types, wrongly called Elzevirian, went out of fashion before 1770; and Fleischman, a German in the employ of the Enschedes at Haarlem, whose types on French models satisfied the type buyers of England and Holland for many years.

The first book in the English language—Caxton's *Recuyell of the Histories of Troy*—was printed in the Netherlands. The type resembles that attributed to Colard Mansion, a printer of Bruges. Whether Caxton made the types he afterwards used in England or had them brought over from the Netherlands is not ascertained; their style was distinctly Flemish. His immediate successors, De Worde, Pynson, and Faques, were of French birth, and had French tastes, and their types resembled the black letters of the printers of the day of Paris and Rouen. Black letter maintained its popularity in England and in the Netherlands after it had fallen into disuse in France. There was no English foundry of note before the time of John Day (printed 1546 to 1584), and English printers had for the time to accept Dutch types with their mannerisms. English readers, in fact, showed a marked preference for black letter, which was used in some of the most popular books such as the first edition (1525) of Tyndall's New Testament, Coverdale's Bible (1535), Cranmer's Great Bible (1540), and the authorised prayer-books. In the reign of the Roman Catholic Mary Roman was the proper text for books of devotion; but under the reign of Protestant Queen Elizabeth prayer-books in black letter had the preference. Fox's *Acts and Monuments* (1560) was in black letter. Soon after the printers evinced a partiality for Roman for English classics: the writings of Shakespeare and Bacon appeared in Roman. Black letter was out of fashion at the close of the 16th century. It is now only a display letter.

The first English type-founder of note was Joseph Moxon, who founded from 1659 to 1683. His types could not be compared with those of his rivals in France and Holland. The first English founder who was really able to compete with these foreign houses was William Caslon (1692–1766). His types were not novel in design, but their merit consisted in their technical excellence—their careful cutting and good founding. They were especially readable. The style retained its supremacy in Great Britain for more than half a century. Baskerville of Birmingham (1706–75) was another eminent founder. His first types followed the style of Caslon; afterwards he developed a style of his own. His Roman was remarkably round, open, and clear, and is to many book-lovers the embodiment of all that is beautiful in type. Before the 18th century had closed the styles of both Caslon and Baskerville had lost favour, and the publishers called for a character less angular and more curved. Jackson, a pupil of Caslon, introduced a new style, shown in the magnificent Bible printed by Bensley for Macklin. Vincent Figgins, who commenced founding on his own account in 1792, cut founts in exact imitation of those of Jackson, and his types were very favourably regarded by the publishers. When improvements were made in presses, paper, and ink, light-faced and delicate types were again in the ascendant for book-work. For ordinary work and for newspapers such types were, however, not effective, and Robert Thorne introduced the style known as *bold-faced*.

Alexander Wilson, the first founder in Scotland, who began in 1742, was undoubtedly ahead of his rivals in making types that were at once useful and elegant. They were used by Andrew and Robert Foulis (q.v.) in books that for excellence of typography will favourably compare with those of the vaunted French printer Barbou or the even more celebrated Didot. Wilson's sons maintained the reputation of their father's foundry, and 'Scotch type' was soon regarded throughout the kingdom as the synonym of the highest merit. The new Scotch style was everywhere imitated—even in France it was known as the style Écossais. Before long publishers began to regard the character as too ornate and feminine. A stronger and more austere face then obtained preference, and has maintained its supremacy to the present day. It has had to contend with one most notable competitor. About 1850 the London publisher Pickering induced the printer Whittingham to procure a fount of types from the ancient and then altogether disused matrices of the first Caslon. These were brought out of the limbo in which they had remained for many years, and types were cast from them by modern methods. These proved an extraordinary success. Thus was originated the revival of the 'old style' faces in which so many of our best books are now printed. Other founders, such as Messrs Miller & Richard of Edinburgh, who had no antique matrices, cut faces in imitation of those of Caslon, and by some these are regarded as better than the originals. The two styles—the 'modern' after that of Jackson and the 'old' style after that of Caslon, are those in which nearly all present-day books are printed in Great Britain. A good deal of type is, however, imported from France, and it displays the peculiarities of the French founders of the last century. The Dutch type of the Enschedes of Haarlem is very graceful, but little used at the present day. Several very meritorious adaptations of the Caslon faces to modern fashion

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have been produced in America, especially by the Mackellar foundry of Philadelphia.

The chief *qualities* which constitute good type are, according to Southward's *Practical Printing*, the quality of the metal from which it is made; its smoothness, sharpness of angle, and perfection of finish; sufficient depth of face and the clean formation of the feet and groove; accurate range with all the other letters of the same fount, both in height and width and depth of body; strength of part supporting the 'kern,' if any, and the character of the design of the face, including regularity of gauge, exactness in lining and setting, evenness in 'colour' (equalising of the thickness of the strokes), and due apportionment of space to the 'counter,' producing a harmonious general effect in the impression.

Legibility of Type.—Prolonged experiments made in France about 1882 by means of inquiries instituted among people quite unacquainted with the technics of type-founding and in no way connected with printing, showed that reading was done with less fatigue according as the letters are (1) rounder, (2) more equal in thickness, (3) the up-strokes are shorter, (4) each letter is unlike the others, (5) the long letters are well proportioned to their own body. These conditions, it was held, are best fulfilled by the Elzevir, the Baskerville, and the Didot or 'old style' faces.

See the works cited at PRINTING, many of which deal also with type-founding; Monet, *Les Machines et Appareils Typographiques* (Paris, 1879); the *Caslon Circular*, an English periodical established in 1875; for the history of English type-founding, Talbot B. Reed's *History of the Old English Letter Founders* (1887); and for a general survey of other founders, Theo. L. De Vinne's *Historic Printing Types* (New York, 1886), on which the history given above is based. See also PROOFS (CORRECTION OF), ALPHABET, BLACK LETTER, BOOK, BIBLIOGRAPHY, WRITING.

Type-setting Machines. The first type-composing machine on the Records of the English Patent Office appears to be that of Mr W. Church, dated March 1822. Some others, twenty years later in date, such as those of Young and Delcambre, were for a long time before the public without being adopted by printers, and it is only recently that the prejudice against composing machines is being overcome. Very large sums have been spent by inventors on machines which have proved failures, but still year by year the vast increase of printing and the desire to cheapen the production induces inventors to persevere in the attempt to construct machinery that will satisfactorily take the place of hand compositors.

In the early composing machine by Church 'the types are arranged in files in a case at the top, each file being directly over a slit in a horizontal frame. One of a number of jacks protrudes through each of these slits, each jack being connected with a key in a manner somewhat similar to the jacks and keys of a harpsichord.' It is surprising how closely this description conveys to us the leading idea in most of the type-composing machines invented since 1822. Hattersley's machine, for example (1857), has somewhat analogous movements, but the keys are arranged more like those of a concertina, and the details are different. The 'Fraser' (Edinburgh), the 'Kastenbein' (German), and the 'McMillan' (American) are also on much the same principle, differing, however, materially in details. The leading feature of this class of machine is in having the types in tubes or trays in the upper part of the machine, so that the operator by depressing any particular key releases the corresponding type, which by gravity descends by means of a grooved plate to the composing-stick, this operation being repeated as fast as the keys can be touched till sufficient is set for a line, which is then spaced so as exactly to fill the line as in hand-setting.

Another kind of machine is that of Mackie of Warrington. Two machines are required to complete the operation. By means of the first strips of paper are perforated in such a way that each letter is represented by a particular perforation or position on the slip of paper. This slip, on being run through the second machine, automatically sets the type in lines, which are then spaced as above. In an American machine on this principle (1892) electricity is employed to actuate the apparatus of the second machine, which thus sets the types automatically. As the lines are set they are impressed into matrix paper till a column is completed, which is then ready for stereotyping.

Another kind is the 'Thorne,' a combined composing and distributing machine for which the types require to be nicked, each type having its distinctive nick or nicks. The column of type to be distributed is placed on the upper part of a cylinder which is made to revolve, and each type as it comes opposite the groove fitting its special nick drops into it, and is conveyed to the composing apparatus, which is thus kept supplied with type. The composing part of the machine is actuated by means of keys as in the machines described above, the types being set in long lines which are divided and spaced by another operator.

Still another class is the Mergenthaler or Linotype, in which types are dispensed with, matrices with the letters stamped upon the edge being set instead of types. The matrices are set by means of keys as in other machines, and when sufficient have been set to form a line the matter is automatically spaced out to fill the line exactly by an ingenious application of wedge-shaped spaces. The line being complete, the casting apparatus in connection with the machine is brought into operation, and the *line* is cast solid and ready for printing by simply depressing a lever—hence the name of Linotype. When cast the matrices are reconveyed by suitable apparatus to their respective receptacles and are available for further setting. Various other composing machines have been invented, but the above comprise most of those in practical use.

The distributing of the type has always been an important consideration for machine-setting, and various plans have been adopted. One plan, as in use with the Thorne and McMillan machines, is to have a distinctive nick or nicks on the shank of the type for each letter of the alphabet, by means of which each letter is automatically distributed into its proper compartment in the composing machine. This suits very well for the larger sizes of type, but for the smaller sizes the nicking is a serious objection, as the type is much weakened and there is a large amount of breakage in consequence. For the Fraser, Kastenbein, and Hattersley machines no nicking is required, the distribution of the type by the two former being effected by means of keys, similar to those in use in the composing machine, while Hattersley employs a hand apparatus to fill the trays of his composer. Of the two plans the automatic has the advantage in more rapid distribution, but cannot be adopted for small type, while the keyed machines are not so rapid, but can be used for any size of type.

Regarding the speed of composing by machine in comparison with hand-setting much depends upon the nature of the work, and especially on the kind of copy supplied. If so plain that he who runs may read, any of the above machines may be run at a high speed—8000, 10,000, or even 12,000 types an hour for a limited time, one operator setting in continuous line while another does the

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spacing; but it is evident that so large an output as 12,000, which is equal to about three and a half types per second, cannot be maintained. That machines will come largely into use before long need not be doubted; but it would be well if promoters were to modify the statements in prospectuses as to the capabilities of the operators, if not of the machines.

Type-writer, a machine for producing legible characters on paper by mechanical means without the use of a pen. The Remington (1873) was invented in 1866-68 by C. L. Sholes of Milwaukee. Each letter is produced separately, either by a series of distinct arrangements of the machine as a whole at the will of the operator, or else by actuating a separate device for each letter. each such device being set at work by means of a key on a keyboard. The construction may, or may not, be simplified by contriving that one key shall be available for more than one letter. On this basis type-writers may be divided into two-hand machines and keyboard machines. In the former the operator moves an index with one hand until it coincides with the desired letter or character on an indicator, and then with the other hand he presses a mechanism which brings the paper into contact with an inked type corresponding to the character required. The mechanism then automatically carries the paper along through the breadth of one letter, and the process can be repeated for the next and succeeding letters. Apparatus of this kind is usually fairly cheap, the most expensive being the Hall at £8; and though they are not capable of very great speeds, neat work can generally be done with them. In keyboard instruments each key is marked so as to indicate the character or characters which can be printed by means of it; and as the keyboard is so arranged that those letters which are most frequently in use are nearest to one another, the operator has to 'learn the keyboard,' so that he may be able to strike the appropriate keys without looking for them, before he can acquire high speed of manipulation. In some instruments — Remington, English, Hammond — there are fewer keys than there are characters producible; in that case the operator must move a key or knob with the hand which is the less occupied at the moment when one of the less usual characters (such as a capital letter or a figure) is required: and this action shifts the interior mechanism. In others—Caligraph, Yost, Smith Premier—there is a separate key for every character producible. The opinion of operators seems to be divided as to which of these methods is the more convenient in practice. A keyboard instrument of the last-mentioned class can, so far as the keyboard is concerned, be worked with one finger of one hand; but a rapid operator uses both hands, and generally uses his fingers like a piano-player. Different instruments differ in their touch: some, like the Hammond, require a *legato* rather than a *staccato* touch; others require smarter raps on the keys. In some cases the force with which the type is made to produce an impression on the paper depends on the force of the original stroke; in some the pressing of the key liberates mechanism which acts independently of the finger stroke. The former is advantageous when it is desired to change suddenly from ordinary type-writing to manifolding: the latter is conducive to uniformity of impression, and in most cases machines of this type can have the force of the impact between the type and the paper adjusted by varying the tension of a spring. When the key is pressed down what happens inside the machine depends upon the way in which the types are arranged; in one class of machines ('type-bar' machines) they are fixed at the end of bars arranged in a circle or an arc of a circle, and so pivoted that they will all strike at a common printing point—e.g. Remington, Caligraph, Yost, Smith Premier; in others they are engraved on a type-wheel which is brought round into the proper position by the appropriate key, and the paper pressed against it (Hammond). The advantage of the latter class of machine is that the type-wheel can be changed, and thus small type for foot-notes, italics, small capitals, and other typographical devices can be readily employed, whereas with the type-bar machines such a change can only be effected by extracting each individual type and substituting another for it.

Among type-bar machines some — Remington, Caligraph, Yost, Smith Premier—have the type striking upwards from below, so that the writing is not in sight until the top of the machine (the paper-carriage) is lifted, or, as in the Smith Premier, pulled forward: others have the type-bars starting backwards from a semicircle or the arc of a circle and striking from above or from the front so that the writing is always in sight—Bar-lock, English, and Maskelyne. One very important requisite in this type of machine is that all the letters should come to precisely the same printing point. In the earlier type-writers this desideratum was imperfectly secured: the bearings on which the bar was pivoted were narrow, and the bar itself long: consequently when the joint worked loose, or the bar became a little bent, the work produced was bad in alignment, or straightness of line. In order to obviate this the type must be guided to the exact spot, as in the Bar-lock, where the type-bar falls into a groove, and is there locked in its proper position before the impression is taken, or in the Yost, where the type strikes through a bevelled aperture in a centre guide; or else the construction must be such as not to allow any deviation, as in the Smith Premier, in which the problem has been most ingeniously solved of using very short type-bars with very wide bearings. In type-wheel machines the alignment depends on the accuracy of rotation of the type-wheel into position without axial shift, or with just the proper amount of axial shift, as the case may be. Another desideratum which it seems impossible to attain at present is to avoid the unpleasant effect which is caused to the eye, accustomed to typography, through the apparently abnormal distribution of the letters in a word. In printing, the type 'm' is wider than the type 'i;' in type-writing 'm' and 'i' must occupy an equal space. The objection to this has been largely overcome by the mode of cutting the type-writer fount of types, but by no means wholly so.

The mode in which the type is made to mark the paper differs in different machines. In most cases the type marks the paper through an intervening ribbon saturated with an appropriate ink, which ribbon is automatically made to travel a little at each impression, being wound off one spool on to another, and thus not presenting precisely the same point twice in succession to be squeezed between the type and the paper. In most cases the ribbon is simply unwound; in the Smith Premier the whole breadth of the ribbon comes into use once in each line of printing. In the Yost machine there is no ribbon: the type rests normally against a pad saturated with ink, and the type prints directly on the paper just as in ordinary typography. Different machines present, in addition to the above leading features, greater or less ingenuity in devices designed for practical convenience, as well as for durability and easy repair and maintenance in good condition. One thing of importance in studying any particular machine is to observe what happens when two contiguous keys are sharply depressed at the same

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time, as may occur by accident in rapid working, if the keys are too close together. Some machines will take paper of any width, others only paper of limited width; some are better provided than others with means for taking up wear of the apparatus; some are more nearly noiseless than others; some have simpler arrangements than others for bringing a given part of the paper to the right place for printing or for correction; some have more convenient arrangements for maintaining margins at any desired breadth; some have more convenient devices for cleaning the types, as in the Smith Premier, where this is rapidly accomplished by means of a circular brush screwed up from the base of the machine; some (Smith Premier) lock the mechanism at the end of a line, so that printing comes to an end until the paper-carrier is run back to a new line; in some a smaller depression of the keys is necessary than in others; in some (English) the number of wearing points is brought to a minimum; in some the various parts of the machine are more accessible than in others for cleaning, dusting, and oiling; in some a change is more conveniently made than in others, whereby a hard 'platen' may be substituted for a softer one. The platen is a cylinder against which the type presses the paper: if this be too hard it tends to wear the type and cut the paper; but if it be desired to make copies on carbon paper the carbon paper is placed behind the printing paper with thin paper between; and this alternation of thin paper and carbon paper may be repeated up to

Remington's 'No. 5' Type-writer.

an appreciable thickness; then by firm strokes against a *hard* platen a number of copies may be made. A type-written document may also, if a copying ribbon (one saturated with appropriate copying-ink) be employed, be copied in the copying-press; and if lithographic ink has been employed the print may be transferred to stone. By means of Edison's Mimeograph the type-writer may also be utilised for making numerous copies in printer's ink; but the presence of a ribbon tends to interfere with its efficiency in this respect.

We add by way of illustration a figure of a Remington machine, No. 5, with the paper-carriage at the top raised into the position assumed when the last word written is being looked at. The keyboard and the circle of type-bars will be seen; A is the inking ribbon running from spool to spool; B is the shifter which effects the change from small letters to capitals, and near it is the bell which rings when the end of a line is being approached. The carriage runs on C and D when in its normal position. G is the stop which limits the length of the line.

Typha, one of two distinct reed-like plants to which the name of Bulrush (q.v.) is given.

Typhoid Fever. The name, though firmly rooted in popular and even in scientific usage, is an unfortunate one, as it tends to perpetuate the confusion which long existed between this disease and typhus fever. It is best called *enteric* (i.e. intestinal) *fever;* and that term will be used here. 'Gastric fever' generally means this disease, but this term has been very loosely employed, and should be given up. Enteric fever was long confounded with typhus; though it can now be traced in the records of disease with much probability as far back as the 16th century. Early in the 19th century the connection of severe fevers with intestinal lesions was recognised in France; but the credit of finally proving the non-identity of typhus and enteric fever was due to Dr (Sir William) Jenner in 1849–51.

Symptoms and Course.—Enteric fever chiefly affects children and young adults; it is rarely met with after middle life. The period of incubation (see MEASLES) is generally from ten to fourteen days, but may in rare cases be as short as two days, or as long as three weeks. The onset is generally gradual, the patient complaining of weariness, headache, sickness, or diarrhœa for some days before he is compelled to take to bed. It may, however, be quite sudden. All the usual symptoms of the feverish state succeed; the temperature generally reaches 103°, sometimes 105° or 106°, but is one or two degrees lower in the morning than at night. The pulse, except in severe cases, is less quickened than in most febrile diseases; frequently it does not exceed 90 or 100 per minute throughout. The tongue is generally coated on the dorsum, but red at the tip and edges. The digestive organs are much disturbed; sickness and vomiting are frequent at the beginning of the attack; there is almost always some discomfort and tenderness in the abdomen; and diarrhœa, though not a constant, is a very characteristic symptom. Generally during the second week the characteristic rash appears, consisting of small rose-coloured spots coming out in successive crops, so that, though each spot lasts only three or four days, some can be discovered for ten days or more. The rash is rarely copious, and sometimes altogether absent, but it bears no proportion to the severity of the case. The pupils are generally somewhat larger than normal. Some cough is very frequently present. Delirium may be absent throughout, but when present is apt to be very severe and troublesome. The feverish state usually lasts about three weeks, by the end of which time the patient is very thin and weak. Its subsidence in the great majority of cases is very gradual, and convalescence is slow, while relapses are not infrequent. Death may take place by coma, by exhaustion, in consequence of severe hemorrhage from the bowels or of perforation of their coats, or from pneumonia or some other complication; rarely from any cause before the second week.

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The death-rate in hospital cases has varied from 10 to 30 per cent.; usually it is between 15 and 20. It is least below the age of twenty, and increases, though not very markedly, with age. Slight and abortive cases are by no means uncommon.

Post-mortem Appearances.—The one characteristic lesion associated with enteric fever has its seat in Peyer's patches and the solitary glands of the intestine (see DIGESTION, Vol. III. p. 814), particularly at the lower part of the small intestine. They first become congested and swollen, then grayish; the swollen tissue dies and is cast off, leaving an ulcer corresponding in shape to the affected patch. All these stages may frequently be met with in a single case. These lesions explain the diarrhœa and abdominal pain, and the liability to intestinal hemorrhage and perforation which are so characteristic of the disease.

Treatment.—In no disease is careful nursing of more vital importance. The patient must be kept in bed, and saved from fatigue as far as possible. The diet must be regulated with special care, not only during the continuance of the fever, but after convalescence has set in. Milk should be the chief food, artificially digested if necessary, and supplemented with beef-tea, chicken-tea, or other animal soups. No solid food should be given, except perhaps a little dry toast if the patient can take it; solid fragments of food, such as grape-stones, or even particles of the pulp of fruits, may so irritate the ulcers as to lead to hemorrhage or perforation. Stimulants are usually necessary in severe cases. No drug is known to cut short the disease; and in many cases none is required. High temperature may often be brought down with benefit, either by cold bathing or by quinine or other antipyretic drugs. Diarrhœa should be checked by opium or astringents.

Causation.—Enteric fever is one of the most ubiquitous of diseases, being probably present in all parts of the world; but it is less frequent in tropical countries. It is now proved to depend on defective hygienic conditions, and particularly on imperfect disposal of excreta. The poison appears to be discharged in the patient's dejecta, but not to be active till it has been some time outside the body. It is rare, if proper care is taken, for nurses or others attending on cases of the disease to become infected; but the gases from drains into which the dejecta have passed are very dangerous; and still more so are drinking-water and milk which have accidentally become contaminated with them. In the great majority of instances the disease can be traced to infection from a previous case. It has long been recognised that the infective agent must be an organism, and in 1880 Eberth described a form of bacillus as the real cause of the disease. His observations were confirmed by subsequent observers. But it has since been stated that this bacillus is not constantly present in cases of enteric fever; that a very similar though not identical organism, commonly present in healthy stools, called *Bacillus coli communis*, is found in large quantity; and that Eberth's bacillus is merely a variety of this commoner organism, modified by its cultivation within the body. The question that had generally been regarded as definitely settled by clinical evidence in the affirmative, whether typhoid fever is a specific disease always due to infection from a previous case, is thus reopened in a new form.

See Murchison's *Continued Fevers;* Hirsch's *Geographical and Historical Pathology;* and with reference to the organisms connected with the disease, Vallet, *Le Bacillus Coli Communis*, &c. (Paris, 1892); also Barr, *The Treatment of Typhoid Fever* (1892).

Typhon, the Greek name of a son of Seb and Nut (Rhea). See EGYPT, OSIRIS.

Typhoons. See STORMS (Vol. IX. p. 753), WHIRLWIND, WIND.

Typhus Fever (Gr. *typhos*, 'mist,' 'stupor') has probably had an important place among the pestilences attending upon war and famine in all ages; it can be traced back with some definiteness to the 11th century, and from the 16th at least has been a frequent epidemic. It is generally regarded as the pestilence of the 'Black Assize' (q.v.), and has been known as *jail fever* or *camp fever* at various times.

Symptoms and Course.—Typhus occurs at all ages, but most frequently between ten and thirty. The period of incubation (see MEASLES) is most commonly about twelve days, but may be as long as three weeks, or may be absent, the symptoms beginning immediately after infection. The onset is generally definite, sometimes quite sudden; severe headache, with pains in the back and limbs, shivering, prostration, and loss of appetite are generally the early symptoms. The prostration rapidly increases; the face is flushed and dusky, and the expression dull; the temperature generally rises to 104° or 105°, without much remission, and the pulse to 100 or 120 per minute. The tongue is at first white, but generally, except in very mild cases, becomes dry and brown. Vomiting and diarrhœa are only exceptionally present. Generally about the fourth or fifth day the characteristic rash, called by Sir W. Jenner the *mulberry rash*, appears, and after two days or so no fresh spots come out. The rash consists of rounded or irregular spots, which may be at first bright red, but may be from the beginning, or if not soon become, livid or dusky, owing to minute hemorrhages (Petechiæ, q.v.) into the skin, of which they are the seat. The rash is rarely absent, except in children; and its copiousness and lividity are generally in direct proportion to the severity of the case; when very dark, it constitutes the so-called *black typhus*. It generally remains visible till the crisis. About the end of the first week the headache gives place to delirium, generally of a quiet type; and during the second week this often passes into partial or complete unconsciousness. The pupils are generally much contracted. Towards the end of the second week the patient becomes more and more feeble and prostrate; tremors of the muscles, with jerkings of the limbs, or picking at the bedclothes are almost always present. But about the fourteenth day, if the patient live so long, a rapid change takes place called the *crisis*. Within from twelve to thirty-six hours the temperature falls to normal or lower; the pulse is slowed in proportion, intelligence returns, and the patient feels no discomfort but weakness. In a few days the appetite becomes ravenous, and convalescence is rapid and uninterrupted. Relapses are almost unknown, and complications infrequent. In fatal cases death usually takes place in the second week, either by coma, by failure of the heart, or by asphyxia from congestion of the lungs; but it sometimes occurs after a few days' or even a few hours' illness. The death-rate in hospital cases is usually from 15 to 25 per cent.; but under unfavourable circumstances—e.g. in wars or sieges—it has sometimes been 50 per cent. or even higher. In children typhus is hardly ever fatal; its danger increases in a very marked degree with the age of the patient.

Post-mortem Appearances.—If the patient die while the rash is present, it remains visible after death. The internal organs present no distinctive changes, the fluidity of the blood and softening of tissues present are also met with in other rapidly fatal febrile diseases.

Treatment.—No means is known of cutting short the disease. Good nursing, a plentiful supply of fresh air, administration of abundant liquid nourish-

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ment, in many cases free stimulation are required. Sleeplessness is often a serious symptom, and requires to be met by opiates.

Causation.—Typhus is a disease specially associated with filth and overcrowding. It is generally met with, therefore, in the squalid parts of large towns. Epidemics are very frequently associated with want and privation, as in war and famine. It is extremely contagious; but there is abundant evidence that the virulence of the poison is much reduced by abundant dilution with fresh air, hence the special importance of free ventilation in its treatment. In the great majority of cases it can be traced to infection from a previous case; instances to the contrary are so few that its origin *de novo*, strongly maintained by Murchison, must be regarded as extremely improbable. No characteristic organism has been discovered. The infection can be conveyed by clothes, &c., but much less readily than some other infectious diseases—e.g. scarlet fever and smallpox. It is rare for a person not himself infected to convey the disease to one who has not been in contact with the sick.

It is a disease for the most part of temperate climates. At the present day Ireland, Russia, Italy, Persia, and North China are its chief seats.

See Murchison's *Continued Fevers;* Hirsch's *Geographical and Historical Pathology.*

Tyr, the name of a war-god in the old Norse mythology, a son of Odin. He loses his hand in binding the Fenriswolf, and is himself slain in the struggle which slew Garm, the fiercest hell-hound of all. The third day of the week, the *Dies Martis* of the Romans, is called after Tyr, in old Norse *Týs* (gen. of *Týr*) *dagr;* A.S. *Tiwes dæg* (the first word being in genitive), from which our English *Tuesday.* The word is of course seen in Lat. *Ju*-piter, Gr. *Zeus,* Sansk. *Dyaus.* See SCANDINAVIAN MYTHOLOGY.

Tyrant (Gr. *tyrannos*), a name given in modern times to an arbitrary and oppressive ruler, but originally applied not necessarily to one that exercised power badly, but merely to one that had obtained it illegally, and therefore equivalent to our word *usurper.* See GREECE, Vol. V. p. 387; GOVERNMENT.—The THIRTY TYRANTS in Athenian history were a body of rulers invested with sovereign power after the close of the Peloponnesian war. They were all native Athenians, but members of the aristocratical party, and chosen by the Spartan conquerors, who, knowing the animosity existing between the democracy and oligarchy of Athens, hoped to rule the city through the agency of the latter. Their government was a positive 'reign of terror,' marked by the most infamous cruelties. It lasted only one year, when it was overthrown by the return of the Athenian exiles under Thrasybulus. For the Thirty Tyrants in Roman history, see GALLIENUS.

Tyrant-birds (*Tyrannidæ*), a family of passerine birds, chiefly confined to tropical regions. Among the 350 species of which the family consists, there is great diversity of form and even of habit. Noteworthy species are the 'Scissor-tail' (*Milvulus forficatus*), remarkable for its grace of form and beauty of plumage, and the common American Shrike-billed Kingbird or Bee-martin (*Tyrannus tyrannus*). The latter, like all the tyrant-birds, is of a pugnacious temper, and is a determined enemy to sparrow-hawks and other small birds of prey; but it is much disliked by farmers on account of its propensity for eating bees.

Tyrconnel, RICHARD TALBOT, EARL OF, was born in Ireland about 1625, but early crossed to London, and soon gained the favour of the royal family by a readiness for such dirty work as the plot to blacken the reputation of Anne Hyde. James II. on his accession at once created this scoundrel Earl of Tyrconnel, with command of the troops in Ireland, and in 1687 appointed him Lord-deputy of Ireland. He strove hard to undo the Protestant ascendency, but the Revolution quickly brought his schemes to nought. With characteristic treachery he tried to intrigue with William, but it was not by wretches of his stamp that the liberties of Englishmen were to be built up. On the discrowned king's arrival in Ireland in 1689, the Earl was created Duke of Tyrconnel. After the fatal battle of the Boyne Tyrconnel retired to France, returned in 1691, but died at Limerick in August of the same year. His name occurs in the doggerel ballad of *Lilliburlero,* which 'whistled a deluded prince out of three kingdoms.'

Tyre (Phœn. *Sûr* or *Sôr,* 'rock'), a city of ancient Phœnicia, situated in 33° 12′ N. lat., which probably derived its name from the double rock on which it was first founded. There were two towns of Tyre closely connected together in historical times; one on the continent, the other on the island opposite, with an area of 200 acres. The more important of the two was the continental town, called Palæ Tyrus. 'It stands out in the sea, as the palm of the hand does from the wrist,' says an old writer. The situation of the entire city was one of the most fertile, and its magnificent combination of land and sea scenery formed the theme of many an ancient poet and seer.

Its ancient history is fully dealt with under PHŒNICIA. Tyre was a city on an island in the sea in the 14th century B.C., when it is described in an Egyptian papyrus: 'Tyre the double port is its name; water is carried to it in boats; it is richer in fish than in sands.' There is a list of places that traded with Tyre in Ezekiel xxvii., with the names of the articles of commerce, including its famous purple dye. Isaiah called it the 'mart of nations.' Explorations were made here in 1874, 1877, and 1881. Its two ports—the Sidonian to the north, and the Egyptian to the south, each about 12 acres—have been identified by Major Conder, as also the probable site of the old cemetery. Alexander the Great made a causeway from the shore, which has increased in breadth to a quarter of a mile by drifting sand. An aqueduct bringing water from the springs at Ras el Ain existed previous to 724 B.C. The population of the island city seems to have been crowded together, the houses rising story upon story, so that a larger number might be accommodated. Tyre was enlarged and beautified by Hiram, and sustained sieges by Shalmaneser, Nebuchadnezzar, Alexander (332 B.C.), and Antigonus. Under the Romans, Cleopatra received Tyre as a present from Antony; but the last trace of its independent existence was taken from it by Augustus. A Christian community was founded there at an early period. In St Jerome's time it was again the noblest and most beautiful city of Phœnicia, nay, one of the most prosperous and noble cities of the whole East. In the 7th century it came under the dominion of the Saracens, and so remained until taken by the Crusaders, who defended it till 1091. Soon after it was destroyed by the Moslems; a visitor in 1355 found it a mass of ruins. From the settlement of the Metâweleh or Persian schismatics, in 1766, the town began to be rebuilt. About 5000 inhabitants now dwell among the ruins of its ancient glory, finding scanty livelihood in its insignificant exports. Here both Frederick Barbarossa and Origen are buried.

Tyree′, an Argyllshire island, one of the Inner Hebrides, 19 miles NW. of Iona. Having a maximum length and breadth of 14 and 6 miles, and an

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area of 34 sq. m., it is treeless and flat, with a mean elevation of only 20 feet, except in the south, where three hills attain 400 feet. There are a score of fresh-water lakes. Nearly forty Scandinavian forts dot the shores, and there are also a ruined castle, nine standing stones, &c. Pop. (1831) 4453; (1891) 2600, who rear cattle, fish, and export poultry and eggs.

Tyrnau (Magyar *Nagy-Szombat*), a town of Hungary, on the picturesque Waag valley railway, about 30 miles NE. of Presburg. 'Little Rome' it used to be called, and not inappropriately, when it was the place of residence of the Hungarian primates. Its university (1635–1774) was transferred to Pesth. Pop. 10,830.

Tyrol (Ger. *Tirol;* in England usually called *the* Tyrol), a crown-land of the Austrian empire, lying between Bavaria on the N., Switzerland on the W., Italy on the S., and Salzburg and Carinthia on the E., and embracing an area of 10,302 sq. m., to which is administratively added Vorarlberg (q.v.), 1005 sq. m., on the western frontier. The province is traversed from east to west by the three chains of the Alps; the central chain (11,000 to 12,500 feet), which is crossed by the road over the Brenner Pass (4588 feet), the principal line of communication between Italy and Germany, separates the German from the Italian side. The population consists of Germans (60 per cent.) and Italians (40 per cent.), and numbered 805,176 in 1880; Vorarlberg had at the same date 107,373 inhabitants. The population of both combined was 928,920 in 1890. The people are noted for their fidelity to the Catholic faith and their devotion to their country, but are somewhat backward in education. The romantic mountain-scenery attracts thousands of visitors. The more important valleys are formed by the river Inn (flowing north to the Danube) and the Adige (going south to the Adriatic), and their tributaries. Pastoral pursuits furnish the chief occupations, though some grain is grown, and considerable attention is paid to the cultivation of the forests (46 per cent. of the area), of fruit, wine (5,720,000 gallons annually), and silkworms. The mines were formerly of great value; but little is now extracted, except of salt (at Hall), anthracite, and a little iron. Metal industries flourish in German Tyrol, cotton manufactures in Vorarlberg, and silk in Italian Tyrol. The chief town is Innsbruck (q.v.), with a university (1677; with 700 students); Trent, Roveredo, Brixen, and Bozen are the next towns of consequence. The provincial chamber consists of sixty-eight members, excluding Vorarlberg, which has its own chamber of twenty members.

Tyrol, the ancient Rhætia, was conquered by the Romans under the Emperor Augustus. After the fall of the empire it was occupied by the Boiardi (Bavarians) and Langobardi. During the middle ages the most important rulers in Tyrol were the counts of Tyrol and the bishops of Trent and Brixen. In 1363 the counts bequeathed their possessions to the Duke of Austria, and they have formed an appanage of the House of Hapsburg ever since, except during the short period 1806–14, a period made memorable by the patriotic resistance of Andreas Hofer (q.v.) and his associates to French and Bavarians.

See Miss Busk, *Valleys of the Tyrol* (1874); Zingerle, *Sagen aus Tirol* (1859); and histories by Egger (1872–80) and Jäger (1880–91).

Tyrone (*Tir-Eogain*, 'Owen's country'), an inland county in the heart of Ulster, Ireland, 48 miles long, with an average breadth of 28. Area, including part of Lough Neagh, is 1260 sq. m. or 806,658 acres, of which 110,000 acres are barren mountain, 72,000 bog, 32,000 water, roads, &c. The surface in general is hilly, and often extremely picturesque, this county lying for the most part between the two mountainous districts which traverse Ulster from east to west; the highest point is Sawell (2236) in the north-east. With the exception of Lough Neagh, the lakes, which are numerous, are small. The principal rivers are the Foyle, Mourne, Blackwater, and the Ballinderry. The geological structure is very much diversified, including mica and primitive limestone in the mountains; old red sandstone occupies much of the plain. Between Dungannon and Stewartstown there is a small coalfield, the produce of which is rich; marble is quarried; and there are traces of iron, copper, and lead. The climate is moist, and the low lands are often flooded. The soil of the plain is a well-tilled fertile loam; that of the hilly districts, sandy or gravelly. There is a large proportion of bog. There are manufactures of linens, coarse woollens, earthenware, whisky, and soap. The chief towns are Omagh (the capital), Strabane, Dungannon, Cookstown, and Aughnacloy; Clogher gives its name to the episcopal see both in the Episcopal and Roman Catholic churches. The county has four parliamentary districts, and returns four members to the imperial parliament. Pop. (1841) 313,011; (1861) 238,500; (1881) 197,719; (1891) 171,278, of whom 93,569 were Catholics, 38,909 Episcopalians, and 33,710 Presbyterians. See ULSTER.

Tyrone, HUGH O'NEIL, EARL OF, 'the arch-rebel,' was the son of an illegitimate son of Conn O'Neil, the first Earl of Tyrone, and was himself in 1587 invested with his grandfather's title and estates. But he soon plunged into intrigues both with the Irish rebels and with Spain against the authority of Elizabeth, and in 1597 assumed the ancient title of 'The O'Neil,' and began the struggle openly. His success soon spread the flame of insurrection over all Ulster, Connaught, and Leinster. The queen sent over Essex with more than 20,000 men, and at Ballyduich Tyrone met him under truce, and submitted his demands to Elizabeth. Lord Mountjoy soon succeeded Essex, and quickly subdued the most of the country. But at length in 1601 a Spanish force of 5000 men landed at Kinsale, and 2000 more at Castlehaven. Mountjoy at once besieged Kinsale, while Tyrone advanced to its relief, but was defeated with heavy loss, and severely wounded. Mountjoy pursued him to the north and ravaged his country. After Kinsale fell Tyrone made his submission at Mellefont and was reinstated in his earldom. But under James I. he intrigued anew with Spain, and finally in 1607 found it necessary to flee. His lands were confiscated, and he himself died at Rome in 1616.

Tyrrhenian Sea (anc. *Tyrrhenum Mare*), that part of the Mediterranean Sea (q.v.) between the islands of Corsica, Sardinia, and Sicily on the west and the Italian peninsula on the east.

Tyrtæus, famed for his political elegies and war-songs, was either an Athenian or a citizen of Aphidnæ, in Attica, who lived in the 7th century B.C. The story which represents him as a lame schoolmaster, of mean family, whom the Athenians (ignorant of his lyric power, and jealous of Lacedæmonian domination in the Peloponnesus) sent to the Lacedæmonians, during the second Messenian war, as the most inefficient commander they could select, must be received as a fiction of later times. He rendered, however, to the Lacedæmonians a kind of assistance which the Athenians little foresaw; and while by his elegies he stilled their dissensions at home, by his war-lyrics he so animated their courage in the field

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that they were finally triumphant in their conflict with the Messenians, whom they reduced to the condition of Helots. His songs, a few of which we have complete, and must regard as amongst the finest remains of antique poetry, lived on the lips of the Spartans so long as Sparta was a state. There are editions in Schneidewin's *Delectus* and in Bergk's *Poetæ Lyrici Græci*.

Tyrwhitt, THOMAS, the first adequate editor of Chaucer, was born in London, 29th March 1730. He was descended from a good Lincolnshire family, and his father, at his birth rector of St James's, Westminster, was afterwards canon of St Paul's, archdeacon of London, and canon of Windsor. He was educated at Eton and Queen's College, Oxford, and was elected fellow of Merton in 1755, but left college in 1762 to become clerk of the House of Commons. Finding this office too arduous for his health, he resigned in 1768, and devoted the rest of his life to letters down to his death at London, 15th August 1786. Tyrwhitt was a man of unusual amiability of character, as well as a scholar of great learning and industry, and of fine critical insight besides. His most important work was the well-known and admirable edition of the *Canterbury Tales*, with dissertations, notes, and glossary (2 vols. 1775; 5 vols. 1778); the next, the posthumous edition of Aristotle's *Poetics* (edited from his papers by Burgess and Randolph, 1794). Other books were a refutation of the antiquity of the Rowley poems of Chatterton (1778), a dissertation on Babrius (1776), and *Conjectures* on Strabo, on Æschylus, Euripides, Aristophanes, &c.

Tytler, WILLIAM, of Woodhouselee, historian and antiquary, was born at Edinburgh, 11th October 1711, educated at the High School and the university, admitted a member of the Society of Writers to the Signet in 1744, and died 12th September 1792. His best-known works are an *Inquiry into the Evidence against Mary Queen of Scots* (1759; 4th ed. 1790), in which he attempted to vindicate her from the charges brought by Robertson and Hume, and an edition of the *Poetical Remains of James I. of Scotland* (1783).

His eldest son, ALEXANDER FRASER TYTLER, a historical writer, and a judge with the title of Lord Woodhouselee, was born at Edinburgh 15th October 1747, educated principally there, but also at Kensington, and admitted to the Scottish bar in 1770. He obtained in 1780 the chair of History in the university of Edinburgh, in 1790 the office of Judge-advocate of Scotland, and in 1802 was raised to the bench of the Court of Session. His acquirements were of the most varied kind, embracing most departments of literature and the fine arts. His writings include a biography of Henry Home, Lord Kames; a Dictionary of Decisions of the Court of Session; and the work by which he is best known, his *Elements of General History* (1801), which has been translated into most of the languages of Europe, and even into Hindustani. He died 5th January 1813.—*His* fourth son, PATRICK FRASER TYTLER, an eminent historical writer, was born at Edinburgh, 30th August 1791, and educated chiefly there, being called to the Scottish bar in 1813. Of his thirteen works the most valuable is his *History of Scotland* (9 vols. 1828–43), beginning at the accession of Alexander III., and terminating at the union of the crowns, a book of more critical research than any work on the same subject that had preceded it, and itself by no means yet wholly superseded. Others were Lives of the Admirable Crichton (1819), Sir Thomas Craig (1823), Wyclif (1826), Scots Worthies (3 vols. 1831–33), Raleigh (1833), and Henry VIII. (1837), and *Progress of Discovery on the Northern Coasts of America* (1832). In consideration of his merits as a historian, Sir Robert Peel conferred on him in 1844 a pension of £200; and he died at Malvern, 24th December 1849. See Dean Burgon's *Life of Patrick Fraser Tytler* (1859).

Tzana, TANA, or DEMBEA, a great fresh-water lake on the high plateau of Abyssinia, south of Gondar. The greatest length is 60 miles; the breadth varies from 30 to 40. It is fed by numerous streams and is the main reservoir of the Blue Nile (q.v.), which flows into and out of it under the name of Abai. The water is clear and full of fish, with hippopotami; there are many small basaltic islands, some of them inhabited.

Tzar. See CZAR.

Tzarskoye. See TSARSKOYE SELO.

Tzetzes, JOHANNES, a Byzantine author of the later half of the 12th century, known as the author of certain works in prose and verse, which, though excessively dull, and without a vestige of literary genius, are valuable as storehouses of classical information not elsewhere to be had. The principal are (1) *Iliaca*, consisting of three distinct poems, entitled *Ante-Homerica*, *Homerica*, and *Post-Homerica* (ed. Bekker, 1816; Lehrs, 1840); (2) *Biblos Istorike*, more commonly called *Chiliades*, or a collection of more than 600 stories, mythical, legendary, &c. (ed. Kiessling, 1826), written in that worthless sort of verse, called *political*, which had regard only to syllables, and not to quantity; besides commentaries on Homer, Hesiod, and Aristophanes.

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U

is the twenty-first letter in our alphabet. The Semitic alphabet ended with *t*, which is now followed by the four new letters *u*, *v*, *w*, and *y*, which have been placed at the end because they are differentiated forms, developed at various periods out of the Semitic letter *vau*, whose direct descendant is *F*, which retains its original place as the sixth letter of our alphabet. The letter *vau* was derived from the Egyptian hieroglyphic picture of the cerastes or horned asp (see ALPHABET), which had the value of f. The two bars of our F represent the horns, and the vertical stroke represents the body of the snake. In Y we have the horns and the body, in U and V the body has disappeared, while W is constructed of four strokes which stand simply for four horns. From the Phœnician symbol, whose form was intermediate between F and Y, the Greeks evolved two characters—one was the Digamma (q.v.), which had a consonantal sound, and was carried to Italy before it fell out of alphabetic use in Greece, and survives as our letter F; the other was a sign called *upsilon*, which at first resembled our Y, but soon lost the tail, and took the form V, which had the value of *u*. The form V was carried to Italy, where it represented the sound *u* as well as that of our *w*. From V, the lapidary and capital form, the cursive and uncial forms U and u were developed. In the 10th century the capital form V began to be preferred for initials, and the uncial form u for medials, and the consonant being more common at the beginning of Latin words, and the vowel in the middle, the initial form V was gradually appropriated as the symbol for the consonant, and the medial form u as the symbol for the vowel. But the old usage long survived. Thus as late as 1611 *v* and *u* were still used in King James's Bible merely as initials and medials, as is shown by such spellings as *vnto* and *haue*. In modern English the letter has three principal sounds, the long *u*, the short *u*, and the neutral vowel. The long *u*, heard in the word *rude*, has the sound of the A.S. *ú*, which in southern English has usually become a diphthong, represented by *ou*, as in the words thou, house, mouse, written *thú*, *hús*, *mús* in A.S., or by *ow*, as in the words how, now, cow, brow, town, written *hú*, *nú*, *cú*, *brú*, and *tún* in A.S. In northern English the old sound is frequently retained, cow, house, and town being pronounced *coo*, *hoose*, and *toon*. In the word room (A.S. *rúm*) and booth (A.S. *búth*) the spelling has been changed, but the old sound has been preserved. The short A.S. *u* has in a few cases retained its sound, as in the words *full* and *bullock*, but, like the long *ú*, it has frequently lapsed into the neutral vowel, as in *sun* and *hunger* (A.S. *sunne* and *hungor*). This sound is now more commonly represented by *o*, as in son and some, A.S. *sunu* and *sum*. Here again the old sound is occasionally retained in northern English, as in come (A.S. *cuman*), pronounced *coom*. In French (as in *du*) and in Welsh *u* has a narrow sound unknown in English (though common among the lower classes in some parts of Scotland), which is nearly the same as that of the German *ü* in Müller. The peculiar sound of the *u* in duke is due to the fact that it is a loan-word from the French *duc*. The German and Italian *u* is the long *u* in brute.

Ubeda, a town of Spain, on a plateau between the Guadalquivir and Guadalimar, 26 miles NE. of Jaen. It contains a large castle, and manufactures cloth, soap, and leather. A flourishing town under the Moors, it witnessed the victory in 1210 of the kings of Navarre and Castile over Abdallah Mohammed of Morocco. Pop. (1887) 18,713.

Ucayali, a river of Peru, one of the head-waters of the Amazon, is formed by the confluence of the Apurimac and Urubamba, and winds more than 1200 miles north to join the Marañon opposite Nauta. It traverses a rich, heavily wooded country, of great heat and moisture, and very unhealthy: enormous areas are flooded during the rainy season. It is navigable for large vessels as high as Sarayacu (6° 30′ S.).

Udaipur, or MEWAR, a native state of Rajputana (q.v.); area, 12,670 sq. m.; pop. (1891) 1,832,420. The capital is Udaipur (sometimes spelt *Oodeypore*), picturesquely situated on a ridge overlooking a romantic lake, 140 miles SW. of Ajmere; pop. 38,143.

Udall, NICHOLAS, author of *Ralph Roister Doister*, the earliest English comedy, was born in Hampshire about 1506, was admitted a scholar of Corpus Christi College, Oxford, took his B.A. degree in 1524, and became the stern master of Eton and of Westminster, and canon of Windsor. He died in December 1556. Neither his translations from Erasmus and P. Martyr, his *Flovres for Latin Spekynge* (from Terence), nor his Latin plays (*De Papatu*, *Ezekias*) would have preserved his name without his *Ralph Roister Doister*, a merry comedy in the manner of Plautus, licensed and believed to have been printed in 1566, but almost certainly written twenty-five years before. The plot turns on the gull and coxcomb Ralph Roister Doister's ridiculous and unsuccessful courtship of the comely widow Dame Christian Custance, the intrigues of his parasite Matthew Merrygreek, and the final triumph of the successful suitor, Gawin Goodluck, after his return from sea. Editions are by Durant Cooper for the Shakespeare Society (1847) and Mr Arber (1869).

Udal Right. See ALLODIUM, LAND LAWS.

Udine, a walled town of Italy, capital of a province, lies in a rich wine country, 85 miles by rail NE. of Venice. It has wide, handsome streets, and contains a Romanesque cathedral, an archbishop's palace, a beautiful campo santo, and, on a hill in the midst of the city, a castle, formerly the residence of the patriarchs of Aquileia. Udine manufactures silk, leather, gloves, hats, &c. Bonaparte resided in the doge's castle at Passariano, close by, during the preliminaries of the peace of Campo-Formio. Pop. 23,254.

Ueberweg, FRIEDRICH, philosopher, was born 22d January 1826 at Leichlingen in Rhenish

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Prussia, studied at Göttingen and Berlin, and, after teaching in a school at Elberfeld and lecturing at Bonn University, became in 1862 professor at Königsberg, where he died, 9th June 1871. He is best known by his *System of Logic* (1857; 5th ed. 1882; Eng. trans. 1871) and his *History of Philosophy* (1863–66; 7th ed. 1886–88; Eng. trans. 1872), a compendious handbook from an empirical and eclectic standpoint. He gained the Vienna Academy's prize for an essay on the authenticity and order of Plato's works; and an essay on Schiller as historian and philosopher was published posthumously. See a monograph by Lange (1871).

Ufa, capital of a Russian government extending to the foot of the Urals, stands 280 miles ESE. of Kazan, on the Biëlaia, a stream which through the Kama falls into the Volga. Pop. 19,500. The government, formed in 1865 out of part of Orenburg, is nearly the size of Roumania (see RUSSIA).

Uganda, an African state extending along the north-west shore of the Victoria Nyanza. It was first visited by Speke and Grant, and by Stanley was called the 'Pearl of Africa.' The country is partly mountainous, partly undulating, partly a plain, and very fertile on the whole and well wooded. The climate is mild and singularly uniform throughout the year, the variation being from 50° to 90° F. The Waganda, who may number 5 millions, are a brave and warlike people speaking a language of the Bantu stock. At the request of King Mtesa, English Protestant missionaries settled here in 1877, and French Catholics followed in 1879. The Christians had much to endure from Mtesa's son, King Mwanga, by whose orders Bishop Hannington (q.v.) was murdered in 1885 on the borders of Uganda, and hundreds of Christians were burned. The presence of Arabs and Mohammedanism further complicated matters, and intestine struggles were not long in breaking out. Dr Peters tried to extend German influence hither, but the Imperial British East Africa Company regarded Uganda as being within the British sphere under the Anglo-German agreement of 1887, and that it was so was settled between England and Germany in 1890. Meanwhile the French priests obtained a decided ascendency over the king. In 1892 a war broke out between sections of the people calling themselves respectively Protestants and Catholics (the latter greatly in the majority), and much excitement was caused in France by reports that two English military officers in the service of the East Africa Company had unfairly assisted the Protestants to defeat the Catholics. The company, finding their responsibilities beyond their resources, announced their intention of evacuating Uganda—the missionaries resolving, however, to remain. To render the crisis less acute by postponing the evacuation till 31st March 1893, Lord Rosebery as Foreign Secretary promised a government grant, all responsibility being expressly left on the company's shoulders.

See the travels of Stanley and other African travellers; Felkin and Wilson, *Uganda and the Egyptian Soudan* (1881); the memoirs of the missionary A. M. Mackay (1890); Casati, *Ten Years in Equatoria* (1891); and Mrs Stock's *Story of Uganda* (1892).

Uglitch, a town of Russia, on the Volga, 58 miles W. by S. of Jaroslav. In its Kreml (now in ruins) Ivan the Terrible murdered his eldest son in 1581. Pop. (1885) 11,183.

Ugogo, an inland province of German East Africa, between Tanganyika and the coast.

Ugolino, COUNT, the most notable member of a great Tuscan family, whose vast territorial possessions lay between Pisa and Piombino. In the 13th century the Counts Gherardesca exercised a preponderating authority in the republic of Pisa, and were prominent supporters of the popular interests in opposition to the encroachments of the nobles. In the great feud between the Guelphs and Ghibellines they became warm partisans of the latter, and were the irreconcilable enemies of the Visconti, who headed the Guelphs. The most famous of this family is Count Ugolino della Gherardesca, whose name and fate have been invested with undying interest by Dante. Having resolved to usurp supreme power over Pisa, he formed an alliance with Giovanni Visconti, the head of the Guelphic party. The plot was, however, discovered, and both Giovanni and Ugolino were banished from the city. The latter, uniting himself with the Florentines and the Lucchese, forced the Pisans in 1276 to restore to him his territories, of which he had been deprived. No sooner was he reinstated in his possessions than he began to devise anew ambitious schemes. The war of the Pisans with the Genoese afforded him the opportunity he desired. In the battle fought at the island of Malora, 6th August 1284, Ugolino, by treacherously abandoning the Pisans, occasioned the complete annihilation of their fleet, together with a loss of 11,000 prisoners. When the news of this disaster spread, the Florentines, the Lucchese, the Sienese, the Pistoians, and all the other enemies of the Pisan republic gathered together to destroy it, as the stronghold of the Ghibellines in Italy. Being thus brought to the brink of ruin, the Pisans had no other resource left than to throw themselves into the arms of him whose treachery had reduced them to such misery. From the time of his election he gave free scope to his vindictive, despotic nature, persecuting and banishing all who were privately obnoxious to him, on pretext of state delinquency, till at length a conspiracy was formed against him, headed by his former supporter, the archbishop. Dragged from his palace, 1st July 1288, after a desperate defence, he was thrown into the tower of Gualandi, with his two sons and two grandsons, where they all perished amid the agonies of starvation, for which reason their dungeon has since borne the ominous name of the 'Tower of Hunger.' In spite of this, the family again rose into importance; and in 1329 we find a Gherardesca at the head of the republican authority in Pisa.

Ugrians, a name used by Castrén for Ostiaks, Voguls, and Magyars belonging to the Ugro-Finnic division of the Ural-Altaic peoples. See FINLAND, Vol. IV. p. 625.

Uhland, JOHANN LUDWIG, German poet, was born at Tübingen, 26th April 1787. When a young man at the university of his native place his mind was divided between law and ancient German literature. The latter was his favourite pursuit, and he began to publish poems at an early age, his first collection of *Gedichte* appearing in 1815. To this he kept adding all the rest of his life; the 60th edition was published in 1875, and there have been many more since. Other productions of Uhland's are admirable essays, *Ueber Walther von der Vogelweide* (Stuttg. 1822) and *Ueber den Mythus von Thor* (1836); a most valuable collection of old popular songs, *Alter hoch- und nieder-deutscher Volkslieder* (1844–45); *Schriften zur Geschichte der Dichtung und Sage* (8 vols. 1866–69); and two respectable dramas, *Herzog Ernst von Schwaben* (1818) and *Ludwig der Baier* (1819). He died at Tübingen, 13th November 1862. Uhland was a patriotic politician as well as a poet. He entered the representative assembly of Würtemberg in 1819 as liberal deputy from Tübingen, and was also a delegate to the Frankfort Assembly of 1848; but though Germany has reason to be grateful for his services to the cause of constitutional liberty, it is as a

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poet he is best remembered. His pieces are full of spirit, spontaneity, and truth, finely picturesque in their sketches of nature, and exquisite in their varied tones of feeling. Nothing, indeed, can surpass the brevity, vigour, and suggestive beauty of his ballads, in which a romantic sweetness of sentiment and a classic purity of style are happily combined. Uhland is the acknowledged head of the 'Swabian school' of German poets. Longfellow translated some of his ballads in *Hyperion;* and translations by Platt (1848), Skeat (1864), and Sandars (1869) have also appeared. See Lives by his widow (1874), Dederich (1886), Holland (1886), and H. Fischer (1887).

Uhlans, a name (derived through the Polish from the Turkish-Tartar) originally given to light cavalry armed and clothed in semi-oriental fashion. A body of Uhlans was formed for the French army by Marshal Saxe. But the word is now best known as a term for the Prussian light cavalry armed with the lance, who gained glory by their dash, bravery, and swiftness of movement during the Franco-German war.

Uigurs, a Turkish people of Eastern Turkestan who long preserved a separate identity. See GENGHIS KHAN.

Uintah Mountains. See ROCKY MOUNTAINS.

Uist, NORTH, an island of the Outer Hebrides, 65 miles SSW. of Stornoway. It is 18 miles long from west to east, and from 3 to 13 miles in breadth. The eastern half of it is so cut up by lochs and watercourses as to have the appearance of an archipelago—a brown, peaty, dreary bog, partly relieved, however, by a line of hills (1133 feet) running along the coast. In the west part, which as a rule is hilly (1500 feet), there is a tract of uneven, low land, exceedingly beautiful in certain seasons, rendered fertile by the drifting of shell-sand from the coast, and producing good clover and grain crops. Pop. 3371.—SOUTH UIST, 36 miles SW. of Lochmaddy in North Uist, Benbecula lying between them, has a maximum length and breadth of 22 and 7¾ miles. Its east coast is much indented by Lochs Skiport, Eynort, and Boisdale. The eastern district is hill or mountainous (2035 feet); the western is alluvial and productive under proper treatment. Pop. 3825 crofters, engaged in fishing and agriculture, and almost all Catholics.

Ujiji, a small country or district on the eastern shore of Lake Tanganyika. The chief town in it, which straggles over great part of two of the thirty-five districts of which the country consists, is the terminus of the great caravan route from Zanzibar, and has long been an important Arab station. Christian missions have been established here. See Hore's *Tanganyika* (1892).

Ujjain, a walled town of Central India, in Sindia's dominions, anciently the capital of Malwa, and one of the seven sacred cities of the Hindus, stands on the right bank of the Sipra, 30 miles N. of Indore. It is 6 miles in circumference, and contains a palace and an old observatory, and exports opium. Pop. 32,932.

Ukase, or OUKAZ (Russ. *ukasdty*, 'to command,' 'to speak'), a term applied in Russia to all the orders or edicts, legislative or administrative, emanating from the czar directly or from the senate. The term is not extended to the orders of ministers.

Ukraine (Polish, 'frontier country'), the name given in Poland first to the frontiers towards the Tartars and other nomads, and then to the fertile regions lying on both sides of the middle Dnieper, without any very definite limits. The Ukraine was long a bone of contention between Poland and Russia. About 1686 the part on the east side of the Dnieper was ceded to Russia (Russian Ukraine); and at the second partition of Poland the western portion (Polish Ukraine) also fell to Russia, and is mostly comprised in the government of Kieff. The historic Ukraine forms the greater part of what is called Little Russia (a name first appearing about 1654), which is made up of the governments of Kieff, Tchernigoff, Poltava, and Kharkoff. Compare the maps at POLAND and at RUSSIA; and for the physical features, see RUSSIA, Vol. IX. p. 34. See also MAZEPPA.

Ulcers (Lat. *ulcus*, 'a sore spot'). Ulceration is 'that part or effect of an inflammatory process in which the materials of inflamed tissues, liquefied or degenerate, are cast off, in solution or very minute particles, from free surfaces, or, more rarely, are absorbed from the substance of the body' (Paget on 'Ulcers,' in Holmes's *System of Surgery*). Generally speaking, however, the name of ulcer is not applied to any inflammatory result, unless the substance of a tissue deeper than the epithelial is exposed; and when the cast-off particles are only epithelial the result is termed desquamation, abrasion, or excoriation, although the process may be essentially the same. Ulceration is closely allied to gangrene, the two processes differing in degree rather than in kind. 'When the degenerate or dead substance,' says Sir J. Paget, 'is cast off in one or more portions visible to the naked eye, the process is usually called gangrene; when the portions are not so visible, or are quite dissolved, it is called ulceration.' The degenerate tissues are always suspended or dissolved in a liquid, termed the 'discharge,' or 'ichor,' which varies in appearance and properties according to the cause and characters of the ulcerative process. 'From some ulcers—e.g. the primary syphilitic—it is contagious; from many it appears corrosive, exciting by its acridity inflammatory changes in the tissues with which it is in contact.'

Ulcers may occur on any surface of the body—e.g. the eye, mouth, stomach, intestines, &c.: here attention will be restricted to ulcers on the skin. They may be classified according either to their obvious characters or to their cause. It is most convenient in the first instance to adopt the former arrangement.

A *common, simple,* or *healthy ulcer* is such as is left after the separation of an accidental slough in a healthy person, and is merely a healthy granulating surface, tending to cicatrisation. Its edges shelve gently down to the base, and are scarcely harder than the adjacent healthy skin. Their surface near the border is of a purplish blue tint where the young epidermis modifies the colour of the healing granulations; and within this the granulations have a deeper hue than those at the centre, being most vascular where the cuticle is being chiefly developed. The discharge from such an ulcer is healthy or 'laudable' pus. *Inflamed ulcers* differ less than most kinds from the above described common or healthy ulcers. Their most common seat is on the lower half of the leg or shin. The surface is red, and bleeds easily; the discharge is thin and watery; the edges irregular or shreddy; and the surrounding skin shows a red tinge, and is the seat of a hot and aching sensation. This ulcer most commonly occurs in the infirm and old, the ill-fed and overworked. Hence constitutional treatment, good diet, and complete rest (with elevation of the limb) are here necessary. *Sloughing ulcers,* in the mildest form, are characterised by an aggravation of the symptoms observed in inflamed ulcers; while the surface becomes gray and is cast off in shreds, and the ulcerative process extends rapidly. They are generally associated with a debilitated state of the system. *Phagedæna* (Gr., from *phagein*, 'to eat or corrode') designates a severer variety of sloughing ulcer in which there is much infiltration, and at

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the same time rapid destruction of the affected part, with severe constitutional symptoms. The sore presents an irregular outline, and a gray or yellowish surface; it gives off a profuse bloody or ichorish discharge, and is extremely painful. When occurring in isolated cases it usually attacks persons whose constitutions are not merely debilitated but vitiated by scrofula, by the syphilitic virus, by the abuse of mercury, by intemperance, &c. A link between this virulent form of ulceration and gangrene, though more closely allied to the latter, is the terrible disease known in civil practice as *sloughing phagedæna*, and in military and naval practice as *hospital gangrene*. This disorder requires for its development the influence of some of those undefined causes which regulate the outbreak of epidemics, and is peculiarly characterised by its contagious and infectious nature. It is usually engendered by the overcrowding of sick and wounded men, and some idea of its virulence may be formed from the fact that on the return of the French fleet from the Crimean war, no less than sixty deaths from it occurred in one ship in the course of thirty-eight hours. *Weak ulcers* are those in which the granulations are prominent, pale, and soft. They are generally met with in scrofulous cases. *Exuberant* or *fungous ulcers* have also prominent granulations (popularly called 'proud flesh'), but they are firm and bright red like those of a healthy ulcer. They are most often seen in the healing of severe burns. The *chronic, indolent*, or *callous ulcer*, beyond all doubt, gives more trouble to the poor-law medical officer and the workhouse surgeon than any other half-dozen surgical affections. It is usually seated in the lower half of the leg, and is most commonly of an oval form, with its long axis parallel to that of the leg. 'Its base lies deep, and is flat, pale, or tawny and dusky, with very minute or no visible granulations. The margin is usually abrupt, or unequally shelving, or more often thickened, smooth, and rounded. Both the margin and all the surrounding integuments, often for many inches round, are thickened, hardened, "callous," as with a kind of very firm œdema.'—Paget, *op. cit.*, p. 147. Many volumes have been written on the proper means of treating this form of ulcer. The distinguished surgeon from whose Memoir we have so largely quoted especially recommends opium, regulated pressure, and blistering. A grain of opium night and morning is usually sufficient. The pressure is applied with straps of adhesive or lead plaster on linen, or with an elastic bandage. The object of blistering is not only to stimulate the ulcer, but to soften its callous edges by causing absorption of part of the exudation with which they are infiltrated, and desquamation of the cuticle which covers them. The expediency of healing old ulcers of this kind has often been called in question, inasmuch as serious diseases are said to have followed the healing of such ulcers. In the great majority of cases, however, no untoward results are met with.

The recognition of the *causes* of an ulcer are, however, of even more importance than the characters it presents; for that determines the methods to be employed in order to cure it. It may result from chemical or mechanical injury; from defective circulation, particularly the existence of Varicose Veins (q.v.); and in each of these cases the local cause must be attended to. But it may originate or be kept from healing by a constitutional cause, syphilis, struma, scurvy, or gout; and if so constitutional treatment is of prime importance. Ulceration is also a frequent incident in the progress of malignant, particularly cancerous, tumours. But there is one form of disease, now proved to be cancerous, in which the tumour formation is so slight, and the ulceration so prominent, that it has generally been known under the name of *rodent ulcer*. It generally occurs in the upper part of the face. As in other cancers, free removal is the only treatment which gives hope of cure.

In the *local treatment* of ulcers generally, as of other breaches of surface, the most scrupulous cleanliness is of prime importance; and here, no less than in other departments of surgery, the use of the Antiseptic Method (q.v.) has proved of the greatest value as a means of attaining this end. The particular form of antiseptic most suitable depends on the condition of the sore: in healing ulcers boracic ointment, or if the ulcer be too dry a wet boracic-dressing, usually does well; in inflamed and sloughing ulcers much stronger applications are required. Prominent granulations are generally best treated by the occasional application of solid nitrate of silver.—Ulcer of the stomach is treated at STOMACH.

Uleåborg, a seaport town of Russian Finland, capital of a government, stands on the south bank of the Uleå, on the eastern shore and near the head of the Gulf of Bothnia. It was founded in 1605, and nearly all burned down in 1822. It has dockyards, and carries on a trade in tar, pitch, and timber. In 1854 an English flotilla burned the government property in the place. Pop. (1886) 11,578.

Ulema (Arabic, plur. of *'âlim*, 'learned' or 'wise'), the collective name (which cannot be used as a singular) of the body of professional theologians and doctors of divinity, and therefore of law, in any Mohammedan country. They form the legal and judicial class, and interpret the Koran and the law derived therefrom; they also constitute whatever there is of the nature of a hierarchy in Islam, and their power and influence have often curbed the irresponsible authority of a despot. There are necessarily Ulema in every Mohammedan city, but the most renowned are the Ulema of Constantinople, of Mecca, and of the Azhar university at Cairo. The Ulema of Turkey are the best organised, and possess many privileges and immunities. They include (apart from the *softas*, who are a species of undergraduates training for the rank of Ulema) the *imâms* or readers of the public prayers at the mosques; the *muftis* or doctors of the law, who act partly as barristers, partly as assessors in the courts; and the *kâdis* or *mollas*, who are the regular magistrates, and are under the authority of two chief-justices, the *kâdi asker* of Europe and of Asia; whilst over them all stands the Grand Mufti or *Skeykh-el-Islâm*, the spiritual head (under the Caliph) of orthodox Mohammedanism and supreme judge of the Ottoman empire. The verdicts or decisions of the Ulema are called *fetvas*. The Ulema form the ultra-conservative party in all Mohammedan countries; their interpretations of the Koran, when honest, are rigidly and pedantically in accordance with established tradition, but as individuals they are far from incorruptible. To them more than to any other class is due the lifeless formalism that generally prevails in Mohammedan countries, and they are the prime movers in all outbreaks of fanaticism.

Ulfilas. See ULPHILAS.

Ullmann, KARL, Protestant theologian, was born at Epfenbach near Heidelberg, 15th March 1796, and except during the years 1829–36, when he was professor at Halle, spent most of his life as student and as professor at Heidelberg, where he represented a 'Mediation school' of theology. He died 12th January 1865. His best-known works are on *The Sinlessness of Jesus* (1841; 7th ed. 1863; Eng. trans. 1870) and *Reformers before the Reformation* (2d ed. 1860; Eng. trans. 1841–42). He also wrote against Strauss, and on the essentials

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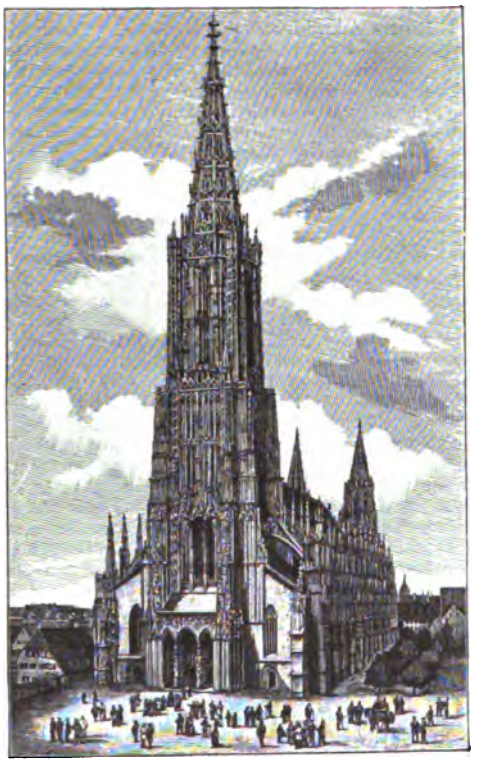
of Christianity (1849; 5th ed. 1865). There is a monograph by Beyschlag (1867).

Ullswater, after Windermere the largest of the English 'Lakes,' between the counties of Cumberland and Westmorland, 5½ miles SW. of Penrith and 11 ESE. of Keswick. Lying 477 feet above sea-level, it is 9 miles long, ¼ to ½ mile broad, and 218 feet in maximum depth. It is divided into three reaches, which increase in beauty and grandeur as one goes up it from Pooley Bridge to Patterdale, a chief feature of the landscape being the lofty mountain Helvellyn (q.v., 3118 feet), which rises from the south-west extremity of the lake. See the map, and the works cited, at LAKE DISTRICT.

Ulm, the second city of Würtemberg, 58 miles SE. of Stuttgart and 91 WNW. of Munich, on the left bank of the Danube, which here receives the Blau and the Iller and becomes navigable. On the Bavarian side of the river is New Ulm, with 7593 inhabitants. Ulm till the war of 1866 was a fortress of the Germanic Confederation, garrisoned by troops of Würtemberg, Austria, and Bavaria. Its fortifications (1842–66) have since been greatly extended. The Protestant cathedral



Ulm Cathedral.

is remarkable for architectural beauty, and is, next to the cathedral of Cologne, the largest church in Germany. It is 455 feet long, 186 broad, and 134 high; the tower and open-work spire (530 feet, the highest in the world; see Vol. IX. p. 644) was only completed on 30th June 1890. The cathedral was begun in 1377, and carried on until 1494; its restoration was undertaken in 1844, and it has a splendid organ (1856–88) with 6286 pipes. Other edifices are the 15th-century town-hall, the 'New Building' (1603) on the site of a palace of Charlemagne's, and the Teutonic Knights' Commandery (rebuilt 1718). Leading industries are the manufacture of cotton, woollen, and other textiles, of paper, leather, beer, &c. Ulm is famed, moreover, for ornamental pipe-bowls and pastry called Ulmer bread. Pop. (1871) 26,290; (1890) 36,201, of whom one-fourth were Catholics. The Romans had a settlement at this important point. In 1531 the city accepted the Reformation. Ulm was in October 1805 the scene of the defeat by Ney of General Mack, and of his surrender with 28,000 Austrians. In 1802 it was attached to Bavaria, and in 1810 became part of Würtemberg. See works by Pressel (1873–78), Schultes (1881), and Löffler (1881), besides an article in the *English Illustrated Magazine* (1886).

Ulmaceæ, or ULMEÆ. See URTICACEÆ.

Ulphilas, or WULFILA, the translator of the Bible into Gothic, was born about 311 A.D. among the Goths north of the Danube. Consecrated a missionary bishop to his fellow-countrymen by Eusebius of Nicomedia in 341, after seven years' labour he was forced to migrate with his converts across the Danube. For over thirty years he laboured in Lower Mœsia, at the foot of the Hæmus, visited Constantinople in 360 in the interest of the Arian party, and again in 381, only to die a few days after his arrival. For the history of the great monument of Teutonic philology which renders his name for ever memorable, see GOTHS.

See the Lives by Waitz (Hann. 1840) and Bessel (Gött. 1860), the Hulsean Essay by C. A. Scott (1885), and H. M. Gwatkin, *Studies of Arianism* (1882).

Ulpianus, DOMITIUS, a celebrated Roman jurist, born at Tyre about 170 A.D., who held juridical offices under Septimius Severus and Caracalla, and, on the accession of Alexander Severus (222), became his principal adviser and *præfectus prætorio*. He was murdered in a mutinous riot by his own soldiery in 228. Ulpian was a voluminous writer, and as a jurist he takes the first rank after Papinian. In the *Digest* of Justinian there are no fewer than 2462 excerpts from Ulpian, forming about a third of the whole. Of the originals, which are almost entirely lost, the principal were *Ad Edictum*, a commentary on the Edict in eighty-three books, and *Ad Sabinum*, a commentary on the *Jus Civile* in fifty-one books. The so-called *Fragmenta* of Ulpian, first published at Paris by Tilius in 1549, consist of twenty-nine titles —the *Tituli ex Corpore Ulpiani*, edited by Hugo (Berlin, 1834) and Böcking (Bonn, 1836). See Abdy and Walker, *The Commentaries of Gaius and the Rules of Ulpian* (1870; 3d ed. 1885).

Ulrici, HERMANN, a German writer on philosophy and æsthetics, was born at Pförten in Lower Lusatia, 23d March 1806, studied law at Halle and Berlin, but early devoted himself exclusively to literature and philosophy. In 1834 he was appointed to a chair at Halle, and here he laboured till his death, January 11, 1884. In philosophy he belonged to the theistic school of Fichte the younger, Wirth, and Carriere, revolting from the pantheistic tendencies of Hegel's idealistic rationalism. His first work was his *Geschichte der Hellenischen Dichtkunst* (1835), which was followed by a very ingenious essay, *Ueber Shakspeare's dramatische Kunst* (1839; Eng. trans. 1846). Other works are *Ueber Princip und Methode der Hegelschen Philosophie* (1841); *Das Grundprincip der Philosophie* (1845–46); and a *System der Logik* (1852). His books *Glauben und Wissen* (1858), *Gott und die Natur* (1862), *Gott und der Mensch* (1866), and *Leib und Seele* (1866) naturally appealed to a still wider circle of readers. Further Shakespearian studies were an edition of *Romeo und Julia* (1853) and a *Geschichte Shakspeares und seiner Dichtung* in vol. i. of the German

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Shakespeare Society's version of the Schlegel-Tieck translation (1867).

Ulster (Lat. *Ultonia*), the most northern of the four provinces of Ireland, is divided into nine counties—Antrim, Armagh, Cavan, Donegal, Down, Fermanagh, Londonderry, Monaghan, and Tyrone, each of which is separately described. Ulster seems to have formed one of the most ancient divisions of Ireland, and was the seat of the Hy-Nialls or O'Neills, as well as of the lesser septs of O'Donnell, O'Cahan, O'Doherty, Maguire, Mac-Mahon, &c. The north-eastern portion, now the county of Down, was early overrun by John de Courcy, and subsequently by Hugh de Lacy, and was the most permanent seat of English power in the north; but although various efforts were made by the English to effect a permanent settlement in the north and north-west, the success was but nominal until the reigns of Elizabeth and of James I., when the plantation of Ulster was effected (see IRELAND, Vol. VI. pp. 204, 205). Of this gigantic scheme of colonisation the chief seat was the county of Londonderry (q.v.). The Scottish element has long been dominant in some parts of Ulster, especially the north-east, but is very unequally distributed. The originally English and Scottish element varies from 75 per cent. in Antrim to about 20 in Cavan. Ulstermen had a very important share in extending the area of civilisation and culture in the United States. When about 1720 the great exodus of Irish Protestant Nonconformists began (100,000 are said to have crossed the Atlantic in ten years) the English settlements south of New England consisted of the strip of country east of the Alleghanies. Scoto-Irishmen formed the vanguard that penetrated beyond amongst the dreaded Indians, and were the main stock from which descended the backwoodsmen and fighting farmers who for fifty years bore the brunt of Indian warfare. In 1861 the whole population of Ulster was 1,914,236, the Roman Catholics numbering 966,613; in 1871 the total was, owing to emigration, 1,833,228, of whom the Catholics were only 897,230; of the total in 1881, 1,730,542, the Catholics were 833,566; and in 1891, of a total of 1,617,877, there were 744,353 Catholics, 427,810 Presbyterians, 361,917 Protestant Episcopalians, 40,525 Methodists, and 41,885 of all other denominations. The distribution of confessions varies in different parts of the province; while the Protestants are about 75 per cent. of the whole in Antrim, they are only 20 per cent. in Cavan. The preponderance of Protestants in parts of Ulster has led to diversity of feeling and aims between Ulster and more thoroughly Catholic parts of Ireland; and the determination of Ulstermen to offer resolute resistance to all schemes of Home Rule was emphasised by a great convention of 12,000 delegates at Belfast on 17th June 1892. Belfast (q.v.) is the most enterprising town of Ulster and of Ireland; flax-spinning is the most important industry after agriculture. In 1890 the area under flax was 96,896 acres, in 1891 only 74,612; in 1890 there were used in Ulster 20,045 tons of home-grown flax as compared with 19,607 tons imported; in 1891 the figures were 12,455 tons of home-grown and 25,387 tons imported. The order of baronets, nominally founded for the defence of Ulster, had the 'bloody hand' of the O'Neills, the Ulster arms, given them as their cognisance (see BARONET). For the Ulster Herald, see HERALD. The Ulster system of 'Tenant Right' has been substantially incorporated in Irish legislation of 1870–87 (see LAND LAWS). See, besides works cited at IRELAND (and in the section of that article on the Irish Church), the articles TYRCONNEL, TYRONE, ORANGEMEN; and John Harrison, *The Scot in Ulster* (1888).

Ultimus Hæres, in Law, means the crown or the state, which succeeds to the property of those who die without leaving next of kin, or who, being bastards, have no next of kin.

Ultramarine. See BLUE.

Ultramontane (Lat., 'beyond the mountains'—the Alps—namely, in relation to France), that party in the Church of Rome which assigns the greatest weight to the papal prerogative. See GALLICAN CHURCH, INFALLIBILITY, OLD CATHOLICS, PIUS IX., POPE. (Italians of course use the word in a converse geographical sense for people beyond the Alps and so in the north of Europe.)

Ulugh-Beg, the grandson of Tîmûr, or Tamerlane (q.v.), governed Western Turkestan as regent for his father Shah Rokh, while the latter was employed in regulating the affairs of the southern half of the empire, and succeeded in 1447 to the imperial throne on his father's death. He was a successful warrior, as every ruler of this period had to be, but happened, unfortunately, to conceive suspicions of the loyalty of his eldest son, suspicions founded only upon astrological indications. The offended and injured prince rebelled, defeated and captured his father, and soon after caused him to be put to death, thus fulfilling the prediction, 1449. Ulugh-Beg is known to posterity as the founder of the observatory at Samarcand, as the liberal patron of astronomers, and as himself a most diligent observer. The astronomical tables which bear his name, in all probability compiled by himself and his fellow-labourers, enjoy a high reputation for accuracy. The astronomical works of Ulugh-Beg were written in Arabic, afterwards translated into Persian, and thence the chronological portion of them rendered into Latin (Lond. 1650) by Greaves, who followed with a Latin version of the geographical part in 1652. An independent version of the same work in Latin and Persian was published by Dr Thomas Hyde, at Oxford, in 1665. A new edition of Ulugh-Beg's catalogue of stars will be found in the *Memoirs of the Royal Astronomical Society*, vol. xiii. Some of Ulugh-Beg's coins have been published by S. Lane-Poole, *Catalogue of Oriental Coins in the British Museum*, vol. vii., and *Additions*, part ii.

Ulundi. See ZULUS.

Ulverston (locally *Ooston*), a market-town of Lancashire, in the district of Furness, near the influx of the Leven estuary into Morecambe Bay, 8½ miles NE. of Barrow-in-Furness and 22 NW. of Lancaster. It stands in an extensive agricultural and mining district, has a ship-canal 1 mile long, and manufactures iron, paper, boots, &c. Pop. (1851) 6433; (1881) 10,008; (1891) 9948.

Ulwar. See ALWAR.

Ulysses (also *Ulyxes* or *Ulixes*), the Latin form of the Greek ODYSSEUS, the name of one of the most celebrated heroes of the Trojan war. A son either of Laertes or of Sisyphus and Anticleia, he married Penelope, and by her became the father of Telemachus. Agamemnon visited Ithaca and with difficulty prevailed on Ulysses to take part in the Trojan expedition. Later traditions represent him as feigning madness in order to escape, but in vain. He brought with him twelve ships, and during the siege showed himself equal to any of the chiefs in courage, and superior to all in prudence and ingenuity of resource. His adventures after the fall of Troy form the subject of the Homeric poem called the *Odyssey*. Of these the most remarkable befell in the country of the Lotus-eaters, where the companions of Ulysses ate of the wondrous fruit, and wished to rest for ever; the island of the Cyclops, where he escaped with difficulty from Polyphemus; the island of Ææa, inhabited by

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the sorceress Circe, with whom he sojourned a year; the country of the Cimmerians, where darkness reigns perpetually; the perilous island of the Sirens, the fatal charms of whose singing he resisted by lashing himself to the mast and stopping his men's ears with wax; the alternate horrors of Scylla and Charybdis; the island of Ogygia, where he lived eight years of quiet happiness with the nymph Calypso; and the shores of Scheria, the island of the Phæacians, where in his shipwrecked condition he was succoured by Nausicaa, daughter of King Alcinous. At length he reached Ithaca, and in his beggar's disguise was recognised by his nurse and by his old dog Argus alone. Aided by Telemachus and the swineherd Eumæus, he slew all the insolent suitors of his faithful wife, Penelope. See Lamb's *Adventures of Ulysses*, with introduction by A. Lang (1890).

Umâ, another name for the goddess Kali, wife of Siva (q.v.).

Uman, a town of Russia, 120 miles S. of Kieff, on the Umanka. Pop. 15,393.

Umballa, or AMBÁLA, a city of India, capital of a district of the same name in the Punjab, 150 miles N. by W. of Delhi. The new part of the town has wide roads, monotonously straight, and a handsome church, club-house, and hotels. It is an important railway junction, and carries on a very large trade. The cantonment is 4 miles SE. At Umballa Shere Ali was received at a grand darbár in March 1869. Pop. (1891) 79,270.

Umbelliferæ (*Apiaceæ* of Lindley), a large and important natural order, containing more than 150 genera, 1300 species, abounding chiefly in the temperate regions of the northern hemisphere. A peculiar regularity distinguishes the inflorescence of most of this order—a number of stalks radiating from a common centre at the top of the stem, or of a branch, each of which bears a flower at its extremity, thus forming what is called an *umbel*. The umbel is often compound, the primary stalks dividing in a radiated manner, and forming *secondary umbels* or *umbellules*. The flowers are generally small, although the umbel which they compose is often large. They are generally white, rarely yellow, still more rarely red, though frequently tinged with pink at the edges. The fruit is very peculiar, and consists of two one-seeded, unopening carpels, rarely fleshy, touching one another on the inner side, and there attached to a little column (the *carpophore*), their common axis. The Umbelliferæ are mostly herbaceous plants, rarely shrubby. They usually have divided or compound, rarely simple leaves. They generally abound in a resinous secretion, and a volatile oil, from which many of them derive poisonous and medicinal properties, which are more or less common to all parts of the plant, and often highly developed in the seeds. Acridity is their general characteristic. Some are pleasantly aromatic, others have a powerful and disagreeable smell. In the roots of some, especially when enlarged by cultivation, starch and sugar are secreted, so that they become useful for food, although the peculiar flavour of the essential oil is still retained. Of esculent-rooted Umbelliferæ the carrot and parsnip are the best-known examples; skirret, earth-nut, and arracacha are also of some value. The blanched stems of celery, enlarged by cultivation, are a favourite salad. The candied stalks of eryngo were once much esteemed, and those of angelica are still used. The leaves of parsley, chervil, fennel, &c. are used for flavouring. Lovage (*Levisticum officinale*) is sometimes cultivated as a salad plant. The seeds of anise, caraway, coriander, &c. are used as carminatives. Hemlock, water hemlock, water parsnip, fool's parsley, and many others are narcotic poisons; asafœtida, galbanum, sagapenum, and opoponax are medicinal products of this order.

Umber, a brown earthy mineral used as a pigment. It is found in Italy, Cyprus, England, and other countries. Like Ochre (q.v.), umber contains a large proportion of sesquioxide of iron, but it differs from ochre in containing, to the extent of about one-fifth of its weight, one of the higher oxides of manganese. The mineral is prepared for use as a pigment by grinding it to a powder, washing it with water, and then drying it at 212° F. When so treated it is known as *raw umber*, and is of a pleasing but rather pale grayish-brown hue. *Burnt umber* is prepared from raw umber by calcination, and is of a darker, richer, and more transparent brown colour. Both kinds are permanent either as water-colours or oil-colours, and burnt umber especially is much used by artists as well as by house-painters. Umber was one of the colours employed by the old masters.

Umbilical Cord. See FŒTUS.

Umbrella (Lat. *umbra*, 'a shade'). As a shade from the sun, the umbrella is of great antiquity. In the sculptures of Egypt, Nineveh, and Persepolis umbrellas are frequently figured (see Vol. I. p. 517). In the East, however, its use seems anciently to have been confined to royalty, having the ceremonial significance of the Baldachin (q.v.) or Canopy (q.v.). In China, Burma, &c. umbrellas, especially as sun-shades, are very familiar still. In Greece and Rome umbrellas were regularly used by women, but by men only if they were content to be regarded as effeminate. The custom was probably continued in Italy from ancient times; but at the beginning of the 17th century the invention seems to have been little if at all known in England. In that century, however, it came into use as a sun-shade for the luxurious; and in the reign of Queen Anne it had become common in London as a screen from the rain, but only for the weaker sex. Gay's *Trivia* (1716) speaks of good housewives treading through the wet 'defended by the umbrella's oily shed.' In that century it became not unusual to have a common umbrella in coffee-houses; and *Notes and Queries* (e.g. 5th series, vol. vi. pp. 202, 313) contains many allusions to parochial umbrellas, kept to protect the bare-headed clergyman at funerals. These were made of leather, and were accordingly very heavy and cumbrous. The first person of the male sex who had the moral courage regularly to carry an umbrella in the streets of London was apparently Jonas Hanway (q.v.)—a practice he persisted in in spite of obloquy for thirty years, when his example began to be followed. Still it was long regarded as a sign of infirmity or effeminacy to use umbrellas, and those who did so suffered much unpleasant jeering in consequence. Umbrellas and parasols (the name allotted to the sun-shade, which the word umbrella properly suggests) were at first all brought from abroad, chiefly from India, Spain, and France; now the manufacture of umbrellas has reached an enormous extent in Great Britain. Cotton, oiled silk, gingham, alpaca, silk, and various mixtures of silk and wool are in use for umbrellas. The substitution of steel for whalebone frames became common about the middle of the 19th century.

Umbrella Bird, a fruit-crow of South America (Cephalopterus), so called from its radiating crest.

Umbrella Tree. See MAGNOLIA.

Umbrette. See STORK.

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Umbria, one of the ancient divisions of Italy, lying west of Etruria, and north of the country of the Sabines. It is usually described as extending from the Tiber eastward to the Adriatic; but when the Umbrians first come into history we find them restricted to the ridges of the Apennines, the low-land region bordering on the Adriatic from the Æsis (*Esino*) to the Rubicon, being held by a race of Gallic invaders, known as the Senones. The most important memorial of the Umbrian language is the so-called Eugubine Tables (q.v.); here it is enough to say that it belongs to the Latino-Italian stock. The Umbrians were subjugated along with the Etruscans, but joined the Samnites in their last gallant struggle against Rome, and were crushed at Sentinum (295 B.C.).

On the language there are works by Grotefend (Hannov. 1835-39), Aufrecht and Kirchhoff (Berlin, 1851); see also Saveloberg's *Umbrische Studien* (1873), and Bücheler's *Umbrica* (Bonn, 1883).

Umlaut, a German word invented by Grimm, and now used by all writers on the philology of the Teutonic tongues, including English, for a vowel change in their languages brought about on a preceding vowel by the vowel *i* (or *e*) modifying the first in the direction of *e* or *i*. It is common in German (thus *gänse*, the plural of *gans*; *schlüge*, the subjunctive of *schlug*); and there are survivals in English, as *men* from *man*, *fell* from *fall*, *mice* from *mouse*.

Umritsir. See AMRITSAR.

Umrohah, a town of the North-west Provinces of India, 23 miles NW. of Moradabad. Pop. 36,145.

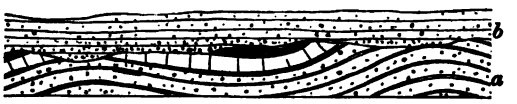
Unalashka. See ALEUTIAN ISLANDS.

Uncial Letters. See PALÆOGRAPHY.

Unclaimed Money, and things left without an apparent owner, were assigned by the Roman jurists to the first person who took possession of them. According to feudal law land left without an owner escheated or fell back to the superior of whom it was held, and movables to which no person could make out a claim were given to the crown as *bona vacantia*. By modern rules of law facilities are given to persons claiming to be entitled to money in court or government stock; subject to any rightful claim, the money or stock is transferred to some public account. Thus, for example, the National Debt Act, 1870, provides that stock on which no dividend has been claimed for ten years shall be transferred to the National Debt Commissioners. A list of names, out of which stock has been transferred, is to be kept, and the list is open for inspection. Re-transfer is made to any claimant who can show his right, public notice being given to enable other claimants to appear. The court will not as a rule direct a re-transfer without an inquiry as to persons interested. Expense is sometimes incurred by persons who put forward claims as next of kin to owners of stock, &c. who have died intestate. In such cases it is well to remember that similarity of name, or vague evidence of relationship, is not enough to establish a title to property.

Unconditioned. See RELATIVITY.

Unconformity, or UNCONFORMABILITY, in Geology, is a structure which implies an interruption in sequence. When strata occur in regular sequence—each successive bed resting regularly upon the surface of the bed subjacent to it—they are said to be conformable. But when one set of beds extends over the denuded surface of another series we have what is called *unconformity*. The structure is shown in the accompanying section, where we have a discordant junction between two sets of strata, the upper series (*a*) resting unconformably on the upturned and denuded edges of the lower series. Such an unconformity usually points to the lapse of a long period of time. In the section the lower series (*a*) must first have been deposited, and subsequently folded and subjected to much denudation, which removed the



tops of the anticlinal arches so as to expose the truncated ends of the beds. In many cases this denudation has been in great part subaërial—the rocks have formed part of a land-surface for some protracted period. Afterwards the denuded land-surface was submerged, so that newer deposits (*b*) were accumulated unconformably upon the older series. A well-marked unconformity thus usually indicates the following succession of changes: (1) a movement of elevation, followed by (2) terrestrial conditions and more or less excessive denudation; and thereafter (3) subsidence accompanied by deposition of sediment over a gradually increasing area.

Unconscious, THE. See HARTMANN.

Unction. See EXTREME UNCTION.

Underground Railway, specially the Metropolitan and Metropolitan District railways of London. See RAILWAY. In the United States the term 'underground railroad' was given before the abolition of slavery to a secret arrangement for helping slaves to escape, by passing them along from one hiding-place to another till they reached Canada or other territory where they were safe from recapture.

Undines (Lat. *unda*, 'wave'), the name given in the fanciful system of the Paracelsists to female water-spirits. They intermarry readily with human beings, and the Undine who gives birth to a child under such a union receives with her babe a human soul. But the man who takes an Undine to wife must be careful not to go on the water with her, or at least must not vex her while there, or she returns to her native element. This notion is elaborated in Fouqué's *Undine*; see also MELUSINE, SYLPH.

Undulatory Theory. See articles LIGHT, OPTICS, REFLECTION, REFRACTION, SPECTRUM, INTERFERENCE, POLARISATION, PHOSPHORESCENCE, and literature there cited; also Basset's *Physical Optics* (1892).

Unguents. See OINTMENTS.

Ungulata ('hoofed'), an order of mammals, including (1) the Artiodactyla (with an even number of toes)—e.g. pig, hippopotamus, peccary, camel, chevrotain, and ruminants like cattle, sheep, and deer; (2) the Perissodactyla (with an odd number of toes)—e.g. tapir, rhinoceros, and horse. Along with these many zoologists now include (3) the Hyracoidea—e.g. Hyrax (q.v.)—and (4) the Proboscidea or Elephants (q.v.). See ARTIODACTYLA.

Ungvár, a town of Hungary, on the river Ungh, 325 miles by rail NE. of Budapest. It is the residence of a Uniat bishop, and contains a cathedral, convent, seminary, normal school, and Catholic gymnasium. Porcelain-earth is exported. Pop. 11,373.

Uniats. See GREEK CHURCH.

Unicorn (Lat. *unum cornu*, 'one horn'), a fabulous animal, mentioned by ancient Greek and Roman authors as a native of India, its body resembling that of a horse, exceeding swift, and having one straight horn a cubit and a half long on

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the forehead. Aristotle makes the oryx (an antelope) and the Indian ass one-horned. Although the descriptions of the unicorn given by the ancients are very unlike the Indian rhinoceros, yet probably that animal was the origin of them all. The word unicorn was unhappily used in translations of the Old Testament for the Hebrew *rĕêm*. The Septuagint led the way in this, by using the Greek *monokerōs;* and it has been supposed by many that the animal meant is a rhinoceros. But from Deut. xxxiii. 17 (where the Authorised Version has 'horns of unicorns') it is obvious the animal was two-horned; the revised translation has 'horns of the wild ox.' Elsewhere the alternative 'ox-antelope' is given in the margin of the new version. The spirally twisted unicorn's horn of heraldry is probably derived from the 'horn' of the Sea-unicorn or Narwhal (q.v.). The unicorn, as the sinister supporter of the royal arms, was adopted by James I. at the union of the crowns (cf. HERALDRY, Vol. V. pp. 668, 669).

See G. R. Brown, *The Unicorn* (1881); C. Gould, *Mythical Monsters* (1886).

Uniform ('one shape') is the distinguishing dress of any special body of individuals—whether soldiers, sailors, or members of a society or club. *Military uniforms* in Great Britain may be said to date from the Restoration, and the consequent formation of a standing army. As early as Henry VIII.'s time the sovereign's bodyguard (now the Honourable Corps of Gentlemen-at-Arms in England and the Royal Archers in Scotland) received a distinctive dress. But this dress was several times changed—e.g. cloth of gold and silver became red and yellow damask in 1529, and then white and black shortly afterwards. The life guards and horse guards, formed in 1661 from the troops which had fought on opposite sides during the Great Rebellion, in buff coats, cuirasses, and steel caps, were then dressed in scarlet coats, feathered hats, and jack boots. Cocked hats were soon after given them, and in 1812 helmets. Somewhat similar changes have taken place in the rest of the army. Military uniform consists of a coat of one prevailing colour, variously ornamented and 'faced' according to rank and corps, a special head-dress and trousers or kilt. Scarlet may be said to be the national uniform of the British army, blue of the German and French. But this only applies to the tunic or jacket, and there are many exceptions. Thus British artillery and many cavalry regiments wear blue, all rifle regiments green, some regiments of the Indian army yellow, drab, and French gray, some colonial and other volunteers gray. In hot climates, during summer, only white uniform is worn, and the white helmet is universal for European troops. The kilted dress of the Highlanders is peculiar to the British army, but the black soldiers of the less well-known West India Regiment are dressed like Zouaves, the jacket being red and trousers blue instead of the reverse. Blue is the uniform of the United States army, the overcoat and trousers sky-blue, the blouse and uniform-coat dark-blue. The head-dress is a very distinctive part of the uniform. At home the Scots Greys and foot-guards wear bearskins, and all fusiliers hats of similar shape; hussars and horse artillery wear Busbies (q.v.), kilted regiments the feather bonnet, Highland Light Infantry the shako, rifle regiments now a small astrakhan busby, staff-officers cocked hats. All others wear helmets, metal for cavalry, blue cloth for other arms; native Indian regiments generally turbans. Forage caps of various patterns are worn in undress. Facings, formerly very prominent, are now confined to collars, cuffs, the busby bags of hussar regiments, and the breast-pieces of lancers' tunics. The rule is blue for royal regiments wearing scarlet, and *vice versâ;* white for English, yellow for Scotch, and green for Irish, if not royal. Cavalry regiments do not follow this latter rule. The colours of the plumes too are very numerous—black, white, red, and a mixture of two of these colours, yellow or green. Generally all hussars and lancers wear blue, all other cavalry red tunics with blue overalls; but the 11th Hussars have crimson overalls, the 6th Dragoon Guards blue tunics, and the 16th Lancers red. Officers of all arms wear, in addition to other marks, badges of rank on their shoulder-straps. One star denotes a lieutenant, two a captain, a crown a major, a star and crown a lieutenant-colonel, a second star a colonel. Cross-swords added to these signify the various grades of general officer, and cross-batons a field-marshal. In the United States army the shoulder-straps of a second-lieutenant are plain, those of a first-lieutenant bear a silver bar at each end, those of a captain two silver bars at each end, those of a major a gold oak-leaf at each end (silver for a lieutenant-colonel); a colonel's shoulder-straps bear a silver eagle, a brigadier's a silver star, a major-general's two and a lieutenant-general's three silver stars, and the general's two silver stars with a gold eagle and device between. The Confederate uniform was gray.

Uniforms in the British navy were not laid down until the reign of George III. Like other nations, the prevailing colour is blue. Tail coats and epaulettes, discarded by the army after the Crimean war, are still worn by officers in full dress, and cocked hats. Rings of gold lace and badges on the epaulettes denote the rank (see EPAULETTE). In the United States navy dark navy-blue is the uniform colour, but in warm weather a service coat of white linen duck trimmed with white braid is substituted, and a white cork helmet may take the place of the cocked hat or service cap. All commissioned officers wear gold bullion epaulettes on each shoulder; rank is indicated by strips of gold-embroidered white oak-leaves or of gold lace, and by devices on the shoulder-straps.

Since the beginning of the 19th century, with its development of field-sports and travelling, it has become usual for British officers not to wear their uniforms when off duty, save on special occasions. In 1815 officers sitting in parliament wore their uniforms; and twenty or thirty years later officers when on leave wore a frogged coat—a spurious kind of undress of their own invention. The *privilege* of wearing plain clothes, now granted also to warrant officers, to a great extent rests with the general in command, and might at any time be withdrawn. Lastly it may be remarked that British uniforms call for a reform, in view of smokeless powder and telescopic sights.

Uniformitarian. See GEOLOGY, p. 149.

Uniformity, ACT OF, a measure passed in 1662, by which a number of clergymen, variously stated at from 800 to 2000, were driven out of the English national church. See ENGLAND (CHURCH OF), p. 359, INDEPENDENTS, NONCONFORMISTS, and works cited under the first two articles.

Unigenitus. See JANSEN, GALLICAN CHURCH.

Union. The crowns of England and Scotland were united under one sovereign on the accession of James VI. of Scotland to the English throne as James I. in 1603; but for above a century longer each country continued to be ruled by its respective parliament, the interest of the one often coming into collision with that of the other. After various fruitless proposals for a closer connection of the countries, the Scots were in 1702 prevailed on to send twenty commissioners to London, who, with twenty-three English commissioners, should

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deliberate on the terms of union. Their proceedings, after being broken off, were resumed in 1706. The union, though popular in England, was the subject of great dissatisfaction in Scotland, being regarded by the bulk of the community as a surrender of national independence to a powerful rival. The treaty was, however, after strenuous opposition, ratified by the Scottish as well as the English parliament, and ultimately completed on May 1, 1707. Its principal condition was the incorporation of England and Scotland into the United Kingdom of Great Britain, the succession of whose monarchs was to be the same as that of England. There was to be one parliament, in which the peers of Scotland would be represented by sixteen of their number elected each parliament, and forty-five Scottish members were to sit in the House of Commons (see PARLIAMENT, NOBILITY). All rights and privileges were to be common between the subjects of both kingdoms, unless when otherwise agreed. The Episcopal Church was confirmed in England, and the Presbyterian in Scotland. Scotland was to retain her Courts of Session and Justiciary, and to have a separate seal for private rights and grants. While the parliament was to raise £2,000,000 by land-tax, Scotland would contribute £48,000 of that sum. The laws of trade, customs, and excise in Scotland were to be assimilated to those of England, and the coinage, weights, and measures of the two countries were to follow a uniform standard. In other matters the laws of Scotland were to remain in force, but might be altered by the parliament of Great Britain. The separate Privy Council of Scotland, which the Act of Union left untouched, was abolished the following year. See SCOTLAND, and books cited there; also FLAG.

Ireland remained a distinct kingdom till 1801, when it was united with Great Britain into the United Kingdom of Great Britain and Ireland. By the terms of the union the separate parliament of Ireland was done away with, and Ireland was represented in the parliament of the United Kingdom by four lords spiritual and twenty-eight lords temporal in the House of Lords, and 120 members of the House of Commons. For the arrangements as to Irish peers, see NOBILITY. The churches of England and Ireland were united into one Protestant Episcopal Church (see under IRELAND the section IRISH CHURCH). The subjects of Ireland were placed on the same footing as those of Great Britain in respect of trade and navigation, and in all treaties with foreign powers; and the law-courts of Ireland were to continue, subject to the regulations of parliament, writs of error and appeals being decided by the House of Lords of the United Kingdom. See IRELAND, GRATTAN, O'CONNELL, PITT, PARNELL, and works there cited.

Union. See POOR-LAWS.

Union, a town of New Jersey, on the Hudson, opposite New York. Pop. (1890) 10,643.

Union College, situated at Schenectady, New York, was incorporated in 1795, and rose to prosperity under the long presidency of Rev. Eliphalet Nott, from 1804 to 1861. It has some admirable buildings, a good library, 200 students, and twelve professors. In 1873 a new charter enabled certain schools of law, medicine, and pharmacy at Albany to unite with the college to form Union University.

Unionidæ, a family of lamellibranchiate molluscs, whose metropolis appears to be in the western hemisphere, represented in Britain by two genera, Unio and Anodonta. The shell is regular, equivalve, and closed, the ligament external. In Unio the hinge is furnished with teeth. Pearls of a large size and considerable value are often found in *U. margaritifera*. At Perth an extensive fishery flourished in the river Tay until the end of the 18th century, and from 1761 to 1764 produced pearls to the value of £10,000.

Union Jack. See FLAG.

Unit. See UNITS.

Unitarians, a name applied generally to all who maintain that God exists in one Person only, and specially to a small Christian sect whose distinguishing tenet is the Unity as opposed to the Trinity of the Godhead. In the more general sense the name of course includes the Jews and the Mohammedans. From the middle of the 2d century to the end of the 3d century there was a succession of eminent Christian teachers—Monarchians—who maintained, against the ecclesiastical doctrine of the Logos, the undivided unity of God. There are said to have been two classes of them—those who taught that Christ was God in such a sense that it was the Father who became man (see PATRIPASSIANS, SABELLIANISM), and those who held that Christ was in nature a mere man, but exalted above all other prophets by the superior measure of Divine wisdom with which he was endowed. The latter class was represented by Theodotus, Artemon, and especially Paul (q.v.) of Samosata. The grand theological struggle which followed in the 4th century between the Arians and the Athanasians may be regarded as but another phase of the Unitarian controversy (see ARIUS, ATHANASIUS).

It is not strange that in the great stir of thought which accompanied the Reformation some should have been found bold enough to question the Catholic doctrine of the Trinity; such there were even before the Socini (see SOCINUS), such as Hetzer, Bassen, Denck, Campanus, and Servetus (q.v.). So widely, indeed, was the Unitarian doctrine diffused that it was thought necessary, in the first article of the Augsburg Confession, to condemn the modern Samosatans, who deny the personality of the Word and Spirit; and in 1527 Althamer published a work against 'the modern Jews and Arians under a Christian name, who deny the deity of Christ.' Under the influence of the elder Socinus Unitarianism gained many adherents in Venetia; but Poland and Transylvania became its principal strongholds. In Poland the nobility, protected by their class privileges, proved favourable; the Unitarian refugees from other countries found here a ready welcome; and in the reign of Sigismund II. (1548–72) this party of reformers was strong enough to form itself into a separate church. Later Poland was the principal field of labour of the younger Socinus, and Unitarianism continued to flourish there till the middle of the 17th century, when, under John Casimir, it was extirpated by force. In Transylvania the Unitarians have succeeded in maintaining their existence, notwithstanding much opposition and persecution, from the Reformation to the present day. Led by George Blandrata (q.v.) and Francis Davidis (1565), large numbers, including the king himself, embraced the new opinions. But in 1572 the Unitarians were forbidden to make any attempts at propagandism, or even to print their religious books; after the incorporation of Transylvania with the Austrian empire (1690) they were robbed by the Roman Catholics of all their churches and church property, forbidden to build new churches without the permission of the emperor, and excluded from all government offices. On the accession of Joseph II. happier times returned. It was forbidden to seize their churches, and an indemnity was even paid them for the loss of their cathedral church of Klausenburg. The Unitarians of Transylvania number about 60,000. They have an organised system of

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church government, with a bishop at its head. They have three colleges—that of Klausenburg, with twenty-four professors and about an equal number of assistant-professors and teachers; that of Thorda; and that of Szekely-Keresztur.

In England, as early as 1548, a priest named John Ashton was accused of Arianism, and escaped with his life only by recantation; and during the reigns of Edward VI., Mary, Elizabeth, and James I. a few suffered martyrdom on similar charges. In the reign of James I. continental Socinianism began to exercise considerable influence in England, and in 1665 Dr Owen wrote that 'the evil is at the door, that there is not a city, a town, scarce a village in England, wherein some of this poison is not poured forth.' But it was in the last decade of the 17th century that the controversy on this subject was most active, and at this time were published the anonymous 'Unitarian tracts.' Hitherto the Unitarians, with the exception of the society formed in London by John Biddle (q.v.), which did not survive its founder, had no organised existence. The first to use the term Unitarians (*c.* 1687) was the heretical mercer and philanthropist, Thomas Firmin (1632–97), a friend of Biddle's. The first preacher who described himself as Unitarian (*c.* 1704) was apparently Thomas Emlyn (1663–1741), a Presbyterian who was imprisoned and fined on the charge of blasphemy. After the passing of the Toleration Act in 1689 the way was prepared for that gradual change by which the orthodoxy of the English Presbyterians passed into Unitarianism. It was at this time that most of the old Presbyterian chapels were founded; and the trusts being 'open,' ministers and people were left free to adopt whatever new opinions should approve themselves to their conscience. Thus the Unitarians may be said to be the successors of the 2000 Presbyterian divines who in 1662 left the Church of England in consequence of their inability to comply conscientiously with the terms of the Act of Uniformity. The English Presbyterians were originally as orthodox as their Episcopal brethren; but having refused to commit themselves to any authoritative creed, they underwent a gradual change to Arian, and at length to Unitarian, views. Many preached such views without exciting attention or controversy, although, until 1813, the law which made it Blasphemy (q.v.) to speak against the Trinity was still in existence. During the later half of the 18th century Dr Priestley (q.v.) appeared as the champion of the humanitarian view of Christ's nature, and by the influence of his writings secured the more open advocacy of that doctrine. In 1773 Dr Lindsey resigned his charge in the Church of England, and became pastor of the Unitarian congregation of Essex Street, London. In 1813 the Unitarians were placed by law fully on a par with other dissenters. The Unitarians of England and Wales are purely congregational in their church government, their only organ for combined action being the British and Foreign Unitarian Association, which holds its meetings annually in London. Their principal place of education is Manchester New College, Oxford, which is, however, an unsectarian institution. They have also a missionary college in Manchester, and the Presbyterian College, Carmarthen, educates Independent and Unitarian ministers. They have at present about 290 chapels and a number of mission stations.

Towards the close of the 18th century there was a certain amount of Arianism among the Moderates in the Church of Scotland. Unitarianism, as a distinct system, was preached at Montrose as early as 1783; and at the beginning of the 19th century some attempts were made to diffuse it by means of missionary efforts. There are now nine congregations in Scotland. That at Edinburgh was originally a branch from the Cameronians (q.v.), but, having adopted the principle of free inquiry, its members gradually embraced Arian, and eventually (1812) humanitarian, views.

In Ireland the history of Unitarianism is intimately connected with that of Presbyterianism. It flourishes principally in the north of the island, and the 10,000 Irish Unitarians are Presbyterians in fact as well as in name.

After 1740 Arian views of the person of Christ were pretty widely diffused among the New England clergy; and in 1787 took place the first secession from the Episcopal Church. By imperceptible degrees many of the New England churches glided into Unitarianism; but it was not until about 1815 that the name began to be much used. At that time the influence of Dr Channing (q.v.) was thrown into the scale; and since then Massachusetts, and particularly Boston, has been the stronghold of Unitarianism in America. The Unitarians have about 400 societies in the United States, and upwards of twenty-five in Boston alone. Harvard University, Cambridge, is not a denominational institution; but it is at present in the hands of the Unitarians, and most of their ministers are educated either there or at the Meadville Theological School, Pa. Besides the Unitarians, properly so called, the Universalists and the Hicksite Quakers are understood to hold anti-Trinitarian sentiments, though they give no special prominence to the doctrine of Divine Unity. There are a few Unitarian churches in the principal colonies of Great Britain; and Unitarian sentiments, under the names of Liberal Christianity and Rationalism, are more or less widely diffused in France, Switzerland, Germany, and Holland.

The early Socinians assumed, as the fundamental principle of their theology, the sufficiency of Scripture, or rather of the New Testament, which, they held, had superseded the Old. Christ was a true man, but conceived of the Holy Spirit; and on account of the divine power which he has received from the Father, and his exaltation as head over all things, he is to have worship offered to him. The Holy Spirit is not a Person, but a Divine influence. Man was created with a mortal nature, but, by the special gift of God, was endowed with a conditional immortality. The gift of immortality he forfeited by disobedience. The fall of Adam, being a single act, could not deprave his own nature, much less that of his posterity; and in the latter death was not a consequence of the fall. Thus the actual consequence of Adam's fall was not any radical corruption of human nature, but rather a moral deterioration. Man, after the fall, retained his free will, and the power of abstaining from sin if he so pleased. Christ's merits did not consist principally in his death, but in his life, his teachings, and his example. Nor was his death regarded as an atoning sacrifice, or as having any vicarious efficacy whatever, but simply as a confirmation of God's will, and the seal of the new covenant. Not Christ's death, but his resurrection, is the central point of the Christian scheme. By this he confirmed his doctrine of immortality, and prepared for his ascension into heaven, where he now fills the office of our great High Priest. Predestination in this system means the decree of God, made before the foundation of the world, that they who believed and were obedient should be saved, and that they who believed not and were disobedient should be damned. Justification takes place when God pardons our sins and gives us eternal life. The Socinians regarded the sacraments as simply external signs testifying to Christian faith. Hence they held infant baptism

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to be irrational as well as unscriptural, but thought that a custom so old and established should be tolerated.

With the early Socinians the English Unitarians have no very direct historical connection. They seem rather to have arrived at independent conclusions through their 'rational' interpretation of Scripture, and their consistent rejection of human authority in matters of faith. The Unitarians of the present day, like almost all Christian sects, must be divided into two classes—a conservative and a progressive class—an old and a new school. The former adopt the old rule of the sufficiency of Scripture, though with many such qualifications as the scientific criticism of the Bible has rendered indispensable. The most conservative Unitarians would not contend for the literal truth of the first chapter of Genesis, nor for the doctrine of verbal inspiration in any shape; the Bible *is not*, but it *contains*, the Word of God. They generally hold the simple humanity of Christ, and even reject the supernatural birth, thinking the portions of the gospels which record that event to be less authentic than those referring to the ministry, the death, and resurrection of Jesus. To the death of Christ they ascribe much the same kind of efficacy as the Socinians, regarding his teaching and example as the most essential part of his work, and his death as an attestation to the truth of his mission, and a preliminary to his resurrection. What, however, chiefly distinguishes the Unitarians of this school from those of the new or progressive school is the place which they give to the miracles as supernatural sanctions of the truth of Christianity. Christ is an ambassador from heaven to earth; the miracles he wrought are his credentials; and the moral and religious truths which he taught are his message. It is not indeed denied that many or all of those truths might be learned from the light of nature, but they have received from Christianity a sanction which gives them a greater degree of certainty than they could otherwise possess. The Unitarians of the progressive school, on the other hand, have abandoned the philosophy of Locke for more spiritual modes of thought. So far from regarding man as entirely dependent upon his reasoning powers for his knowledge of religion, they rather look upon him as standing in a living relationship with the one infinite source of all truth, and as having within his own nature the germs of the highest religious faith. Christianity, accordingly, they regard not as a *message* or a system of truth communicated and authenticated from without, but as the highest expression of the Divine in humanity—an expression not necessarily preternatural, but connected with the previous history of mankind by the natural laws of moral and spiritual development. To this view of Christianity the miracles are not felt to be essential as proofs; and the truths of the gospel are thought to be quite unaffected by any judgment regarding them. The Unitarians, however, of this school, while, from their point of view, they regard the question of the miraculous as one of critical rather than religious interest, do not necessarily reject the miracles as historical facts, though, undoubtedly, a considerable and perhaps increasing number would agree with Theodore Parker and many of the German critics in rejecting them on the twofold ground that they are intrinsically incredible, and that the evidence for them is conflicting and uncertain. Generally speaking, the Unitarians of this school are disposed to regard with favour the freest criticism of the Bible. Holding that inspiration is a quality which is not peculiar to the Bible, but common to all the most elevated religious literature, and that it in no case implies immunity from error, they maintain that the Scriptures must be subjected to the same rules of criticism and interpretation as any other book, and that each book of Scripture is to be studied not as a collection of infallible oracles, but as a record of the mind of the age in which it was produced. In this light, however, and also as a record of the grandest religious movements of the world's history, they hold the Bible in the highest estimation. Such is a statement of the peculiarities of the two Unitarian schools in their extremest divergence from one another; in fact they merge into each other by imperceptible gradations.

It will of course be understood that the Unitarians of all shades of opinion are agreed in rejecting the entire orthodox scheme—including the doctrines of the Trinity, the vicarious atonement, the deity of Christ, original sin, and everlasting punishment—as both unscriptural and irrational. They celebrate the Lord's Supper in their churches, not as a sacrament, but as a service commemorative of Christ's death, and expressive of spiritual communion with him. They also adhere generally to the rite of infant baptism, though there are a few Unitarian Baptist churches. Many object to the name Unitarian as one which might be held to imply a doctrinal bond of union, and to be, to that extent, inconsistent with unrestricted freedom of religious thought. When, at the meeting of the British and Foreign Unitarian Association in 1866, it was proposed to add to the rules a clause defining 'Unitarian Christianity,' the motion was almost unanimously rejected.

See the articles ATONEMENT, RATIONALISM, &c.; the works of Channing, Theodore Parker, and Dr James Martineau; J. R. Beard, *Unitarianism* (1846); J. J. Tayler, *Retrospect of Religious Life in England* (1845; new ed. 1876); Bonet-Maury, *Early Sources of English Unitarian Christianity* (trans. 1884); Dr J. F. Clarke, *Orthodoxy, its Truths and Errors* (Boston, 1870), *Manual of Unitarian Belief* (1884), and *Modern Unitarianism* (1886); also the *History of Unitarianism*, by Mr Leslie Stephen.

United Greeks. See GREEK CHURCH.

United Irishmen. See IRELAND (Vol. VI. p. 206), GRATTAN, TONE.

United Presbyterian Church, a religious body in Scotland, constituted in 1847 by the amalgamation of the 'Secession' and 'Relief' churches. The history of the reformed church of Scotland has been given at SCOTLAND (ECCLESIASTICAL HISTORY). The dissatisfaction felt by the stricter Presbyterians with the Revolution Settlement is described at CAMERONIANS. The Marrow Controversy (q.v.) contributed to increase the discontent with the church; but the immediate cause of the formation of the Secession Church was the restoration in 1712 of the obnoxious Law of Patronage (for which see FREE CHURCH). Violent settlements, effected by the agency of dragoons, now became frequent, and greatly irritated the people; and finally, in 1730, the Assembly enacted that in future no reasons of dissent 'against the determinations of church judicatures' should be entered on record. This attempt to gag the mouths of congregations was more than some could bear, and in October 1732 the Rev. Ebenezer Erskine of Stirling, in a sermon delivered before the synod of Stirling and Perth, denounced the recent legislation and spirit of the church. A committee appointed to consider the matter reported at the ensuing meeting of synod; and Erskine, after three days' 'warm reasonings,' was found deserving of censure. He immediately protested (as did also twelve other ministers and two elders), and appealed to the next General Assembly, which sustained the decision of the synod. Erskine left with the Assembly a written protest, which was also signed by William Wilson,

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minister of Perth; Alexander Moncrieff, minister of Abernethy; and James Fisher, minister of Kinclaven. The Assembly ordained that the four brethren should appear before the Commission in August and retract their protest, on pain of being suspended from their ministry. This they refused to do, and in consequence were declared 'no longer ministers of the church' (November 1733); whereupon they handed in a final written protest, in which they declared that they were obliged to make a secession from them, and appealed to the first free, faithful, and reforming General Assembly of the Church of Scotland.

At first composed of only four ministers, the 'Secession Church' rapidly began to gather strength. Little Christian societies were everywhere formed, which were gradually supplied with pastors either from the Establishment or from youths trained to the work of the ministry by Erskine and his friends. The 'four brethren' drew up a testimony declaring their reasons for separation. What they sought was the vindication of what they held to be evangelical truth, much more than of the mere right of popular election. So much popular indignation was excited by their deposition that it was thought desirable by the majority of the Moderate party to make certain concessions to the Evangelicals, or Marrow party. The General Assembly of 1734 passed some measures distinctly favourable to the latter party, and empowered the synod of Perth and Stirling to remove the censures from the four brethren, and to restore them to their respective charges; but Erskine declined to be 'reponed.' In December 1736 appeared the pamphlet commonly known as the Judicial Testimony, which is a sort of survey of the whole ecclesiastical history of Scotland from the Reformation downwards. In 1737 four other ministers joined the original four. In 1738 the commission of Assembly libelled the 'eight brethren,' and summoned them to appear before the Assembly of 1739, which they did; and after a year of grace the General Assembly of 1740 solemnly pronounced their deposition, and the connection between Erskine and the church of his fathers was for ever at an end.

In 1747 a rupture or 'breach' took place in the new body on the question of the burgess-oath, some affirming that this oath could not be taken by any consistent Seceder, and others insisting that it could, and that the question regarding it ought to be matter of mutual forbearance. The party condemning the religious clause in the burgess-oath formed the *General Associate Synod*, or, popularly, the *Anti-burgher Synod;* the party tolerating it, the *Associate* or *Burgher Synod*. Subsequently a second split occurred in each of these in regard to the province of the civil magistrate, and two other minor denominations were formed, the one assuming the designation of the *Constitutional Associate Presbytery*, or *Old Light Anti-burghers* (1806), and the other that of the *Original Burgher Presbytery*, or *Old Light Burghers* (1799). After holding aloof from each other for more than seventy years, the Burghers and Anti-burghers began to approximate once more, and finally, in 1820, the 'New Light' sections were solemnly reunited. The Old Light sections, amongst whom Dr M'Crie was the most notable man, united in 1842 as the 'Original Seceders,' of which, after union of part with the Free Church, a remnant still forms a separate but small communion. At the date of the 'breach' the number of Secession congregations was 32; when the reunion took place it had increased to 262. Henceforward the history of the Secession Church exhibits a course of uninterrupted prosperity. Ere long the Seceders came under the liberalising influences of the newborn enthusiasm for foreign missions, and started stations in Canada, Jamaica, Trinidad, Calabar, and elsewhere; and in 1847 the Secession maintained more than sixty missionaries. Further, the Secession Church began to assume an attitude more distinctly antagonistic to the Establishment. Though it has never formally avowed the *voluntary* principle (see VOLUNTARYISM, STATE RELIGION), yet the fact that it has maintained itself *ab initio* by voluntary effort has had the effect of determining the great majority of the pastors and people to adopt this principle. The 'Voluntary Controversy' (1829-34) between leading divines of the Establishment and of the Secession served to strengthen the voluntaryism of the Seceders, and brought them more closely into connection with the Relief Church, whose theoretical voluntaryism was perhaps still more pronounced. In the 'Atonement Controversy' both bodies adhered to the liberal evangelical theology of the Marrow. But the Rev. James Morison, for what were thought his extreme views, was separated from the United Secession Church in 1841, and founded the Evangelical Union (q.v.). The desire for union between the two denominations now became stronger than ever. Committees were appointed, and conferences held; and at length, on the 13th May 1847, in Tanfield Hall, Edinburgh, the union of the Secession and Relief was formally accomplished, and the two churches formed themselves into one body under the designation of the United Presbyterian Church.

After the expulsion of Erskine and his friends from the Church of Scotland the assemblies became more determinedly 'moderate' than ever. Never were forced settlements more frequent than about this period; but *relief* was felt to be a necessity, and relief came in the person of the Rev. Thomas Gillespie, minister of the parish of Carnock, near Dunfermline. In 1749 a presentation by the patron to the parish of Inverkeithing proved so extremely unpopular that the presbytery of Dunfermline refused to proceed with it. After various intermediate steps the Assembly of May 1752 ordered the presbytery to induct the presentee on Thursday the 21st. The presbytery did *not* meet on Thursday—at least a quorum did not; and on Friday six ministers of the presbytery, including Gillespie, handed in a 'representation,' explaining why they could not obey the commands of the supreme court. They were warned by the moderator, and informed that if they remained obdurate *one* of them should be deposed. Gillespie was ultimately fixed on as the most suitable sacrifice, and without libel or any formal process whatever, he was arraigned, condemned, and deposed. Out of 158 members present, only 56 voted.

The *Relief Church*, it will thus be seen, was founded simply on an assertion of the right of congregations to elect their own ministers. In 1758 Thomas Boston, minister of Jedburgh, son of the great Boston (q.v.), threw in his lot with Gillespie; in 1761 the congregation of Colinsburgh, in Fife, did the same. The Relief had now got a footing, and steadily increased. At the union in 1847 they numbered 113 congregations, while the Secession numbered 384 congregations; so that the United Presbyterian Church commenced with 497 churches, and a membership estimated at more than 140,000.

The career of the United Presbyterian Church as a corporate body has been one of uninterrupted prosperity. In point of doctrine it adheres (like all the other Presbyterian churches of Scotland) to the Westminster Confession of Faith, and the Larger and Shorter Catechisms. But in 1879 a Declaration Act was adopted, setting forth more

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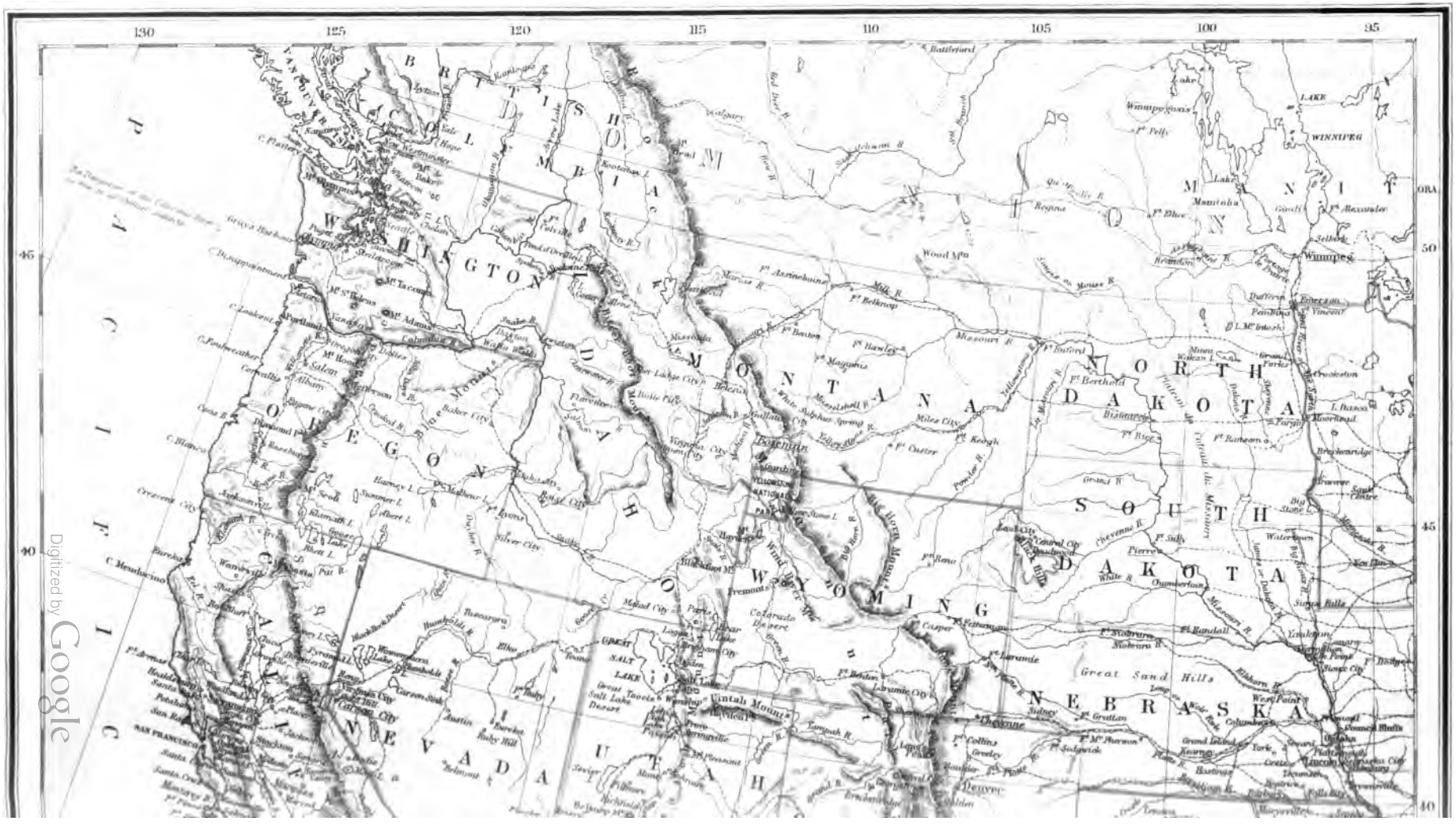
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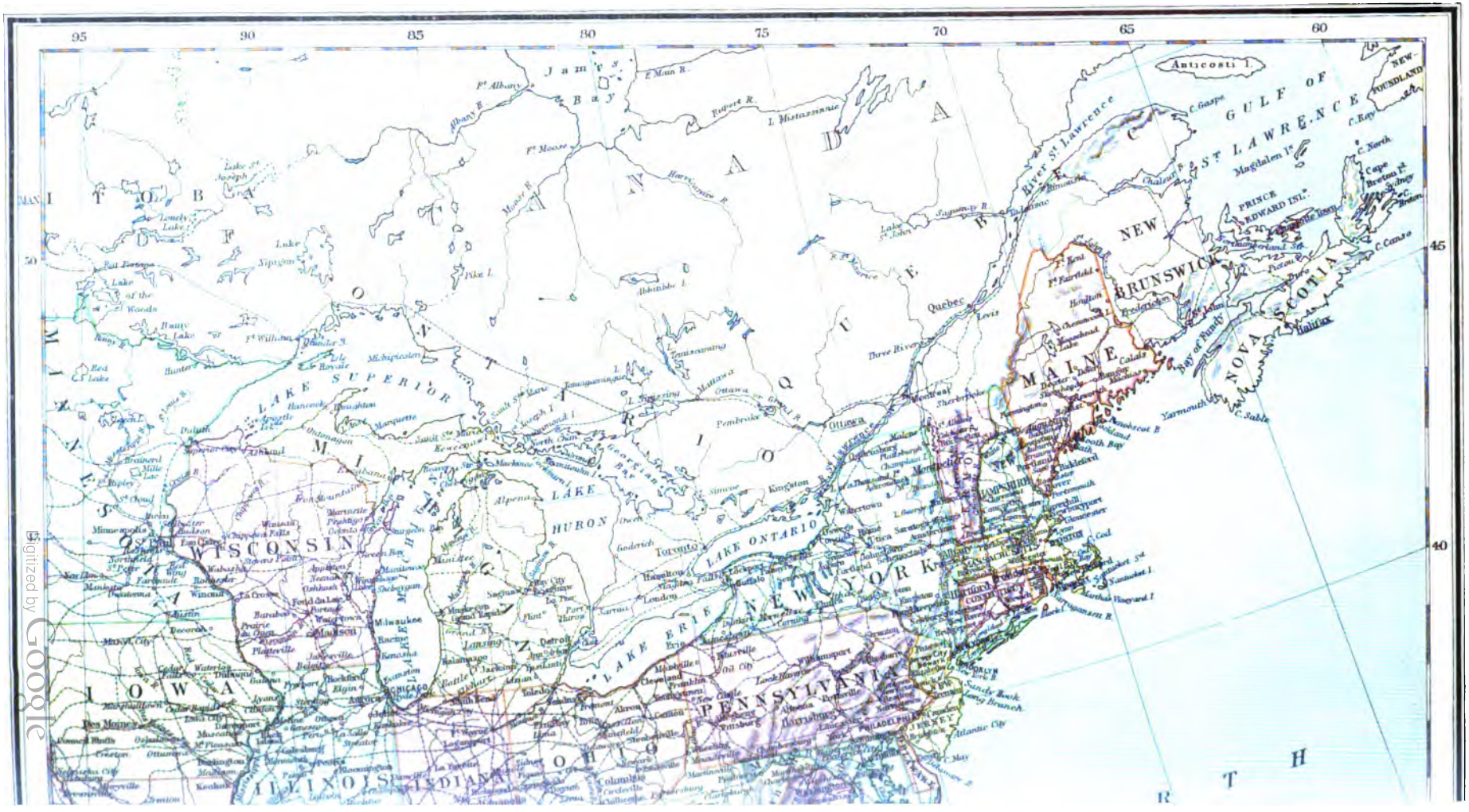
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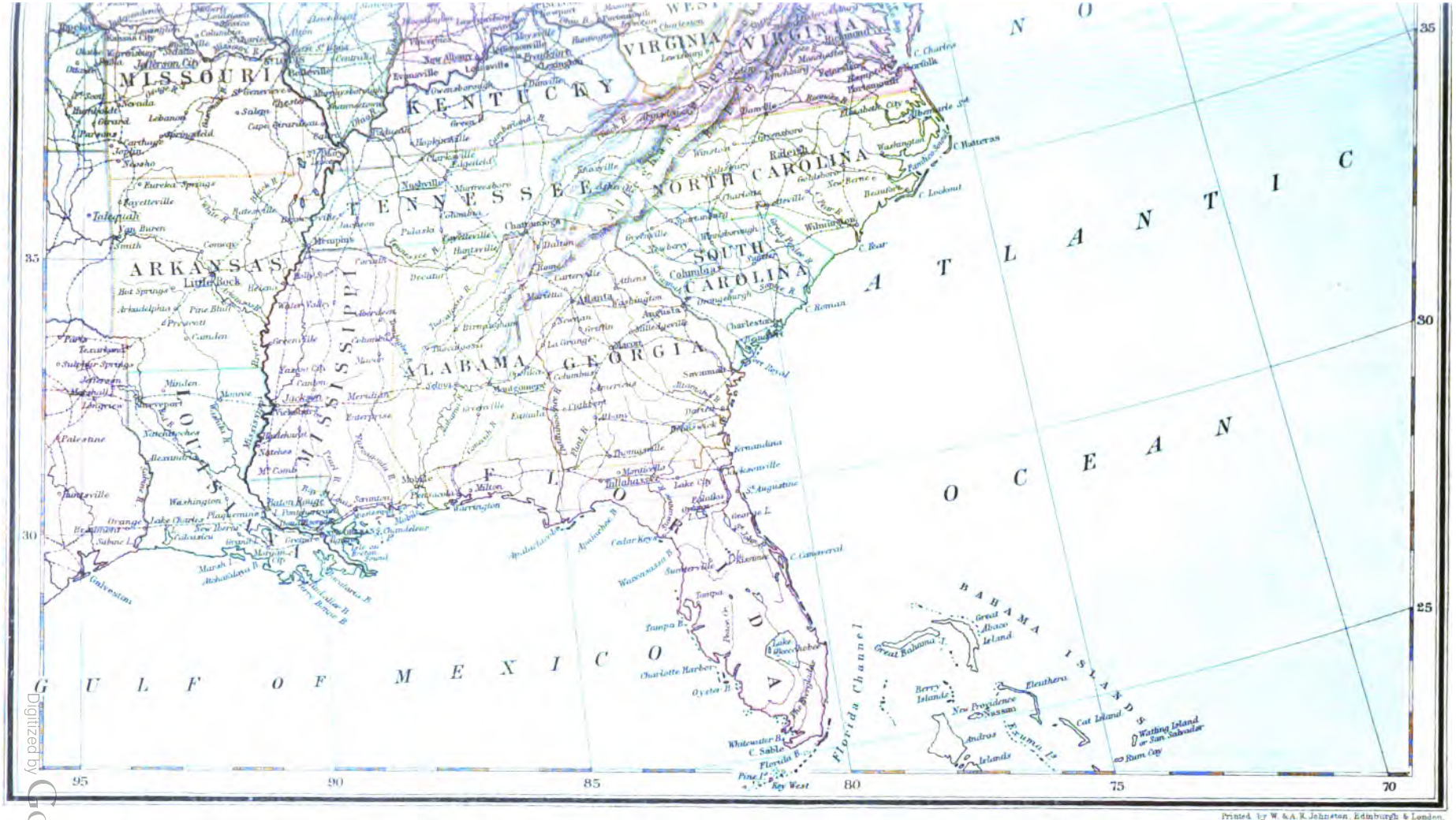

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clearly and fully the view which the Synod takes of the teaching of Holy Scripture in reference to redemption, the divine decrees, man's depravity, salvation, the civil magistrate, the maintenance of the church, and liberty of opinion. Its form of church government is Presbyterian; but, unlike the Established and Free Churches, it has no intermediate courts between presbyteries and the supreme court, the Synod, really an assembly of the whole clergy, with one elder from each kirk-session. It has a Theological Hall and Library in Edinburgh, and a staff of professors. Although inferior in point of wealth to the Established and Free Churches, the United Presbyterian Church has honourably distinguished itself by its general liberality and occasional munificence. Protracted negotiations for union between the United Presbyterian and Free Churches have been without result (see FREE CHURCH). In the year 1875 about 100 congregations of the United Presbyterian Church situated in England were transferred to the 'Presbyterian Church in England.' But the mother-church in Scotland counted in 1892 about 580 congregations and 185,000 members.

See works cited at SCOTLAND (ECCLESIASTICAL HISTORY), ERSKINE (EBENEZER and RALPH), the work on the history of the Secession and of the Relief Churches by A. Thomson and G. Struthers (1848), and the *Lives of the Fathers of the United Presbyterian Church* (1849); the Rev. W. Mackelvie's *Annals of the United Presbyterian Church* (1873), and the short *Handbook* of the history and principles by the Rev. Dr Blair (2d ed. 1889).

United Provinces. See HOLLAND.

United States of America, the largest and most important republic of the world, embracing nearly one-half of the area of the North American continent, and about nine-tenths of its inhabitants. Its area is more than three-fourths that of all Europe: including Alaska, it is almost equal to it; but its population is less than one-fifth of that of Europe.

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GEOGRAPHY, PHYSICAL AND POLITICAL.

The United States consists of two detached portions of the continent of North America and the islands which are adjacent to these sections. The isolated territory of Alaska has been for convenience considered separately, and the reader may be referred to the article on it. The United States proper occupies the central part of the continent, extending from the Atlantic to the Pacific Ocean, and from the Great Lakes to the Gulf of Mexico. By natural and arbitrary boundaries it is separated from the Dominion of Canada on the north, and from Mexico on the south. It lies between the parallels 24° 30′ and 49° N. lat., and between the meridians 67° and 124° W. long. Its greatest length from east to west is about 2700 miles, and its greatest width from north to south about 1600 miles. Its total area is somewhat more than 3,000,000 sq. m. As compared with Europe, for example, the coast of the United States is relatively unbroken, and has few indenting bays or projecting peninsulas. The great indenting sea known as the Gulf of Mexico is of special climatic and commercial importance, but it is as much a geographical feature of Mexico as of the United States. On the coast of the New England states there are many indentations which, though small, furnish commodious harbours. Long Island Sound adds to the commercial importance of the harbour of New York, and farther south are Delaware and Chesapeake bays, Albemarle and Pamlico sounds, and several small indentations such as those which form the harbours of Charleston and Savannah. On the Pacific border, with the exception of Puget Sound, the Bay of San Francisco, and the harbour of San Diego, there is scarcely a noticeable break in the continuity of the coast-line. There are many small rocky islands along the coast of Maine, and on the southern New England coast is a group of islands to which belongs Long Island, the largest of the islands of the United States. Farther south, off the Atlantic coast, and also in portions of the Gulf of Mexico, are many low sand-spits lying parallel to the coast and having behind them shallow channels, lagoons, and swamps. On the Pacific coast there are no islands of importance except the Santa Barbara group off the southern coast of California.

The two great mountain-systems of North America, one along the western, the other near the eastern border, attain their fullest development in the United States, and form the framework or skeleton of its physical structure. The Appalachian system, in the east, though of secondary geographical importance, is the older of the two highland regions, and of primary interest when considered with reference to the history and development of the nation. It enters the country in the northern part of New England (in Maine without the appearance of regular ranges) and New York, and extends south-westward to Alabama and Georgia, being divided by the valley of the Hudson River and Lake Champlain, and that of the Mohawk River, into three distinct sections. The system is described in detail at APPALACHIANS. A coast-plain extends from its eastern base to the sea. It is narrow in Maine, where it terminates in a bold rocky coast indented by bays, and broken into projecting promontories and islands. South of Massachusetts Bay the coast becomes lower and more sandy, and the plain grows gradually wider, with the exception of a narrow belt at New York, until in North Carolina it attains a width of 200 miles. In the southern part of New England it is characterised by hills, and below New York by a distinct coast region and a more elevated slope. This higher region, which in Virginia and thence southward is marked by a somewhat abrupt terrace, varies in altitude from a few hundred to more than a thousand feet, and is known as the 'Piedmont Plateau.' The lower coast region is seldom more than 100 feet above the sea. It has a sandy soil, and in many places there are large swamps near the coast. Much of this swampy country is uninhabitable, but when reclaimed, as it has been in many parts of North and South Carolina, it makes valuable rice-land. Many acres of fertile agricultural land have also been secured in Florida by draining its swamps. The middle elevated region is diversified by hills and valleys, and has a productive soil. The dividing line between it and the low coast-plain marks the head of navigation of most of the streams, and also determines the sites of many important towns.

West of the Appalachian system and lying between it and the western highland is the Central Valley, forming part of the great continental depression which extends from the Arctic Ocean to the Gulf of Mexico. It is almost an absolute plain, rising gradually from the Gulf toward the chain of Great Lakes in the north, and toward the mountains on the east and west. The only important departure from its uniform level character is an elevation of from 500 to 2000 feet, running from southern Missouri through north-western Arkansas into Indian Territory, and known as the Ozark Mountains. This great valley occupies about one-half the entire area of the United States, and the fertile prairies and bottom-lands of the eastern and central portions make it the most important agricultural basin of the globe. From an irregular line west of the Mississippi River the

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land rises in an almost imperceptible slope till it reaches the base of the western plateau. Much of this region, known as the Great Plains, has a light rainfall and is less favourably adapted for agricultural purposes than is the eastern portion, but it affords admirable and extensive pasturage.

The western or Pacific system of mountains forms a part of the vast elevation which extends from the northern to the southern extremity of the western continent. In the United States it is a great plateau of 4000 to 10,000 feet surmounted by a complex system of ranges, in its widest part more than 1000 miles broad. Of this Cordilleran region the Rocky Mountains form the eastern and the Sierra Nevada and Cascade Mountains and the Coast Ranges the western border. For the former, reference must be made to the article ROCKY MOUNTAINS. In the ranges of central Colorado alone nearly forty of the summits have an altitude of more than 14,000 feet. The culminating point of the Rocky Mountains is Blanca Peak (14,463 feet). In the Wind River Mountains, in Wyoming, are the head-waters of the Colorado, the Columbia, and the Mississippi, the three great river-systems of the United States; and in the north-western corner of the same state is situated the National Park, famous for its hot springs and geysers as well as for its magnificent scenery (see YELLOWSTONE). Between the Wahsatch Range and the lofty masses of mountains in Colorado is a region of peculiar interest, consisting of level plateaus, in which the changes of elevation from one plain to another are marked by abrupt descents and steep cliffs. It is furrowed by cañons or gorges, whose sides are nearly vertical; and the bed of the Colorado (q.v.) is in some places more than a mile and a quarter below the surface of the plateau. Between the Wahsatch Range and the Sierra Nevada lies the Great Basin (q.v.), an immense tract having at best but little rainfall, except upon the summits of the ranges by which it is traversed, and none of whose waters are drained to either ocean. Much of this region is at present an absolute desert, although within comparatively recent geological time the conditions were such that two great fresh-water lakes, one nearly as large as Lake Erie, the other more than twice that size, occupied the now arid area. The saline swamps, salt lakes, and sinks of Nevada indicate the former location of one of these lakes; Great Salt Lake is all that now remains of the other.

The Sierra Nevada (q.v.) and the Cascade Range (q.v.) are topographically continuous, and constitute a great mountain-wall which so far as the height of the peaks and the grandeur of the scenery are concerned is one of the most striking portions of the Cordilleran system. Most of the peaks of the Sierras are, however, of granite and metamorphic rock, while those of the Cascade Range are volcanic. The greatest altitude is attained between the parallels 36° and 37°, with Mount Whitney (14,898 feet) as the culminating point. The lofty character of the range is maintained throughout the greater part of California, and the sublimity of the scenery is justly celebrated (see YOSEMITE VALLEY). Between the parallels 39° and 40° the volcanic character of the peaks comes into prominence. From this point there extends northward one of the most remarkable groups of extinct or faintly active volcanoes to be found anywhere in the world: the lava overflows in this region cover an area of above 200,000 sq. m. The most prominent peaks are Mount Shasta (14,442 feet) in California and Mount Rainier (14,444) in Washington. In three separate places rivers have cut a passage through the volcanic portion of the range. The most notable is the passage of the Columbia River in a grand cañon more than 3000 feet in depth. The region which lies north of the Great Basin, between the Cascade Range and the Rocky Mountains, is known as the Northern or Columbian Plateau. Much of it is covered by material thrown out in volcanic eruptions, and has been eroded not only by the Columbia, but by its tributaries. The Shoshone Falls (q.v.) of the Snake River probably rank next to Niagara in grandeur. The Coast Ranges of Washington, Oregon, and northern California consist of numerous and approximately parallel chains, which as a rule pitch off abruptly toward the sea, leaving no coast-plain. Between the Coast Ranges and the Sierra Nevada and Cascade Range is a series of broad valleys, occupied mainly in Oregon by the Willamette River and in California by the Sacramento and San Joaquin. In southern California the mountains of the Coast Ranges diminish in height, but throughout their whole extent they are interspersed with picturesque and fertile valleys.

The drainage of the United States is determined by its physical structure, which is such as to make the country pre-eminent for the number and length of its navigable rivers, and for the abundance and size of its lakes. The lake region lies in the northern part of the country, forming a part of the great belt of lakes which sweeps in a broad curve around Hudson Bay as a centre, and extends from the Atlantic to the Arctic Ocean. Besides the chain of Great Lakes which forms a part of the northern boundary, there are thousands of lakes in the New England states and in New York, nearly ten thousand in Minnesota, and numerous mountain-lakes among the Cordilleras. The peculiar lacustrine character of the northern portion of the United States is undoubtedly a legacy of the glacial period, and it is also a fact worthy of notice that this belt of lakes lies mainly in the customary path of the great cyclonic storms. Most of the important rivers of the United States also have their origin in its northern sections. The drainage areas may be broadly classified as the Great Lake or St Lawrence, the Atlantic, the Pacific, and the Great Basin or interior systems of drainage. The tributaries of the Great Lakes and the St Lawrence within the United States are rather insignificant, but the Lakes themselves form a feature of obvious importance. In the Atlantic system is included all the drainage which ultimately reaches the Atlantic Ocean, but for convenience the rivers might be further subdivided into two classes, one comprising the streams flowing directly into the sea, the other comprehending those of the Central Valley which discharge their waters into the Gulf of Mexico. The rivers of the Atlantic slope rise in the Appalachian mountain region, and are shallow and rapid until they reach the terrace which divides the highland from the true coast region. In this latter portion of the course they are as a rule navigable. The upper courses of the streams furnish available water-power, and have played a conspicuous part in developing the manufacturing industries. The Penobscot, Kennebec, Merrimac, Thames, and Connecticut in New England, the Hudson with its original commercial importance greatly augmented by the Erie and Champlain canals, and farther south the Delaware, Susquehanna, Potomac, James, Roanoke, Neuse, Cape Fear, Great Pedee, Santee, Savannah, Altamaha, and St John's are the principal streams. The Mississippi-Missouri, with its tributaries the Ohio, Platte, Arkansas, and Red rivers, is the chief stream of the Central Valley. Its basin is second only to that of the Amazon, and in length and extent of navigable water it surpasses all other rivers of the world. East of the Mississippi are the Mobile and Appalachicola, and to the west the Sabine, Brazos, and Rio

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Grande. The Colorado, the Sacramento and San Joaquin, the Willamette, and the Columbia are the important streams emptying their waters into the Pacific. With the exception of the Sacramento and San Joaquin, and the lower portion of the Colorado, the rivers of the Pacific coast are not navigable. The rivers of the Great Basin are uncertain in volume and of no great size.

Climate.—With its great extent and its diversified topography, the United States has every variety of climate characteristic of the temperate zone. The annual isothermal lines, except where they are influenced by the two great mountain-systems, pursue a fairly uniform east and west course across the country. They are somewhat deflected to the south by the Appalachian Mountains; but though the high mountain regions produce great local deflections of these lines, a vast elevated mass like the Cordilleran Plateau does not seriously affect the mean annual temperature. In the southern part of the plateau there is a slight general deflection toward the south, but in Montana and the north-western portions of the country the isotherms indicate a warmer annual mean than that prevailing farther east. A marked difference is, however, observable in the disposition of these lines on maps representing respectively the summer and the winter temperatures. The influence of the oceans

Political Divisions.	Capital.	Date of Admission as State.	Land Area in sq. miles.	Water Area in sq. miles.	Gross Area in sq. miles.	Population.	Population per sq. mile.
Alabama	Montgomery	1819	51,540	710	52,250	1,513,017	28·95
Alaska	Sitka	..	..	..	570,000	31,795	..
Arizona	Phœnix	..	112,920	100	113,020	59,620	·53
Arkansas	Little Rock	1836	53,045	805	53,850	1,128,179	20·95
California	Sacramento	1850	155,360	2,380	158,980	1,208,130	7·61
Colorado	Denver	1876	103,645	280	103,925	412,198	3·96
Connecticut	Hartford	1788	4,845	145	4,990	746,258	149·47
Delaware	Dover	1787	1,960	90	2,050	168,493	82·19
District of Columbia	Washington	..	60	10	70	230,392	3291·28
Florida	Tallahassee	1845	54,240	4,440	58,680	391,422	6·66
Georgia	Atlanta	1788	58,980	495	59,475	1,837,353	38·92
Idaho	Boisé City	1890	84,290	510	84,800	84,385	·99
Illinois	Springfield	1818	56,000	650	56,650	3,826,351	67·54
Indiana	Indianapolis	1816	35,910	440	36,350	2,192,404	60·31
Indian Territory	....	..	31,000	400	31,400	186,490	5·98
Iowa	Des Moines	1845	55,475	550	56,025	1,911,896	34·10
Kansas	Topeka	1861	81,700	380	82,080	1,427,096	17·36
Kentucky	Frankfort	1792	40,000	400	40,400	1,858,635	46·00
Louisiana	Baton Rouge	1812	45,420	3,300	48,720	1,118,587	22·95
Maine	Augusta	1820	29,895	3,145	33,040	661,086	20·00
Maryland	Annapolis	1788	9,860	2,350	12,210	1,042,390	85·73
Massachusetts	Boston	1788	8,040	275	8,315	2,238,943	269·26
Michigan	Lansing	1837	57,480	1,485	58,915	2,093,889	35·54
Minnesota	St Paul	1858	79,205	4,160	83,365	1,301,826	15·61
Mississippi	Jackson	1817	46,340	470	46,810	1,289,600	27·55
Missouri	Jefferson City	1821	68,735	680	69,415	2,679,184	38·56
Montana	Helena	1889	145,310	770	146,080	132,159	·90
Nebraska	Lincoln	1867	76,840	670	77,510	1,058,910	13·66
Nevada	Carson City	1864	109,740	960	110,700	45,761	·41
New Hampshire	Concord	1788	9,005	300	9,305	376,530	40·46
New Jersey	Trenton	1787	7,455	360	7,815	1,444,933	184·89
New Mexico	Santa Fé	..	122,460	120	122,580	153,593	1·25
New York	Albany	1788	47,620	1,550	49,170	5,997,853	121·98
North Carolina	Raleigh	1789	48,580	3,670	52,250	1,617,947	30·96
North Dakota	Bismarck	1889	70,195	600	70,795	182,719	2·58
Ohio	Columbus	1802	40,760	300	41,060	3,672,316	89·43
Oklahoma	Guthrie	..	38,880	200	39,080	61,834	1·58
Oregon	Salem	1859	94,560	1,470	96,030	313,767	3·26
Pennsylvania	Harrisburg	1787	44,985	230	45,215	5,258,014	116·28
Rhode Island	Providence, Newport	1790	1,085	165	1,250	345,506	276·40
South Carolina	Columbia	1788	30,170	400	30,570	1,151,149	37·68
South Dakota	Pierre	1889	76,850	800	77,650	328,808	4·23
Tennessee	Nashville	1796	41,750	300	42,050	1,767,518	42·03
Texas	Austin	1845	262,290	3,490	265,780	2,235,523	8·47
Utah	Salt Lake City	..	82,190	2,780	84,970	207,905	2·44
Vermont	Montpelier	1791	9,135	430	9,565	332,422	34·74
Virginia	Richmond	1788	40,125	2,325	42,450	1,655,980	39·00
Washington	Olympia	1889	66,880	2,300	69,180	349,390	5·05
West Virginia	Charleston	1863	24,645	135	24,780	762,794	30·79
Wisconsin	Madison	1848	54,450	1,590	56,040	1,686,880	30·10
Wyoming	Cheyenne	1890	97,575	315	97,890	60,705	·72
Total			2,970,000	55,600 *	3,025,600 †	62,971,081 ‡	20·81

* Including Delaware and Raritan bays (720 sq. miles), not within the boundaries of any political division.
† Exclusive of Alaska, the area of which is estimated.
‡ Including 120,546 Indians not counted in figures given for separate civil divisions.

and of the Great Lakes is at once apparent. Both the heat of summer and the cold of the winter season are greatly modified, whereas in the interior and in the region of the Cordilleras the extremes of heat and cold are both abnormally great. The warm ocean current of the Pacific, which bathes the western coast, produces a more uniform temperature than that which is found on the Atlantic seaboard, along which flows a cold polar current. The annual range of temperature is very great. In winter there sometimes exists at the same instant between the northern and the southern borders a difference of 120°. In summer the diurnal variation of a single locality is in some instances from 40° to 50°. A narrow strip in the south, including the southern portions of Florida, New Mexico, and Arizona, has what may be called a tropical climate. Northern Florida, southern Louisiana, southern Texas, and portions of New Mexico, Arizona, and southern California have a subtropical climate. The sugar and rice regions have a mean annual temperature above 70°. The tobacco region lies between the isotherms of 50° and 60°. The annual temperature of the great cotton region ranges from 60° to 68°, and the prairie regions devoted to the raising of wheat and other hardy cereals seldom have an average temperature above 55° On the wheat fields of the

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Dakotas the annual mean does not exceed 45°. The rainfall of the United States varies greatly in different sections, not only as to quantity, but as to distribution throughout the year. The eastern part of the country is well watered, having not only an ample supply, but an average rainfall for any month which in the long run does not vary much from that of any other month. The requisite moisture is furnished by the Gulf of Mexico and the Atlantic Ocean. The western portion, excepting the strip between the Sierras and the Cascade Range and the Pacific Ocean, and a few limited areas favoured by some peculiar features of topography, has an insufficient supply, and agriculture is dependent for success upon Irrigation (q.v.). Between the two regions is a belt approximately following the meridian of longitude 100°, in which agriculture may sometimes be carried on without recourse to irrigation, but which in any season is liable to suffer from drought. The rainfall of the Pacific coast is peculiar. The westerly winds crossing the warm oceanic current are laden with moisture, which is precipitated whenever the air is sufficiently cooled to lower the dew-point. In Washington, where the land is relatively cooler than the sea for the greater part of the year, rains are frequent, but heavier in winter than in summer. Farther south the land is warmer than the sea in summer, but cooler in winter, so that in northern and central Calfornia, for example, there is a wet and a dry season. In southern California, where the land is, as a rule, warmer than the sea, there is little or no rain, and an arid climate prevails.

The eastern portion of the United States is in the main well wooded. Forests also occur in northern California, Oregon, Washington, and in northern Idaho and Montana. The Cordilleran region and the Great Plains are treeless, except upon high plateaus and mountains. The limit of the growth of trees in the east is approximately marked by the same line which separates the region of ample from that of insufficient rainfall. In fact the distribution of forests very closely follows the distribution of rainfall. There is, however, a tract in the central portion of the country, between the parallels 39° and 43°, which at the time of the advent of the white man was a prairie region with very little woodland. The conditions of rainfall and evaporation, together with the prevalence of prairie fires in this area, were such that apparently trivial circumstances turned the tide against forests. With a modification of these conditions by the increase of civilisation, the prairie regions are disappearing and wooded tracts are increasing.

Political Divisions.—Under its present organisation the United States comprises fifty different political divisions besides its Arctic province of Alaska. Of these forty-four are states enjoying the full privileges afforded by the federal constitution; four are organised territories not yet admitted to statehood; one is an unorganised territory set apart as a home for Indian tribes, and one is a special district containing the capital of the nation. By reference to the table (page 373) the name of each of the divisions, its capital, its area, and its population in 1890 may be seen. Both the land and the water area are given in accordance with the computations of the census of 1890. The chain of Great Lakes is excluded from the calculations of enclosed water surfaces. It is worthy of remark that the centre of population has advanced westward during the ten decades since 1790 in a nearly uniform line along the 39th parallel of latitude. It has progressed during the century from a point 23 miles east of Baltimore, a distance of 505 miles, to a point 20 miles east of Columbus, Indiana. Of the total population 96 per cent. of the inhabitants live in that part of the country which is drained to the Atlantic Ocean, and more than one-half live in the region drained by the Gulf of Mexico. The greatest density of population is in the region having a mean annual temperature of from 50° to 55°. From this maximum the density rapidly diminishes with the increase or decrease of temperature. There are three cities, New York, Chicago, and Philadelphia, having a population of more than 1,000,000. Brooklyn, St Louis, Boston, and Baltimore have each more than 400,000 inhabitants. There are twenty-one cities having a population less than 400,000 but over 100,000; thirty with a population between 100,000 and 50,000; and sixty-six with less than 50,000 but over 25,000. See also the articles on the several states and territories, and on the rivers, lakes, &c.

GEOLOGY AND MINERAL RESOURCES.

The continent of North America began to be developed in the earliest time of which we have as yet any knowledge. It is evident that this part of the world was the seat of certain land areas in the Laurentian age, though we cannot as yet determine the form or position of these ancient islands. In the period of the Lower Cambrian we know that there were dry lands in the Rocky Mountain district, in the region to the south and east of Hudson's Bay, extending as far south as northern New York and along the Atlantic coast from Labrador to Georgia and Alabama. These islands, probably in area small as compared with the present surface of the continent, in a general way outlined the form of the great land. Its subsequent development has been in the main on the lines which were thus traced, the islands of the ancient archipelagoes having become united and extended as the continental elevation has been gradually uplifted above the level of the sea. During the Silurian and Devonian periods not only were the lands enlarged, but the seas lying between them were shoaled, so that the great Mediterranean included within the eastern, northern, and western groups of islands was converted into shallow water.

In the early stages of the Carboniferous period a great portion of the continent, which had gradually been rising from the depths of the sea, was uplifted above the ocean's level and converted into low marshy plains upon which developed the luxuriant swamp vegetation from which the deposits of coal were formed. These plains of the coal-making age were mainly developed within the limits of the United States, occupying a broad field to the west of the ancient mountain-ranges of the Blue Ridge, stretching thence for the greater part of the distance across the valley of the continent to the westward. A fringe of similar lowlands lay along the Atlantic coast from Labrador to the southern part of New England. In this age the continent, which has always been subject to oscillations of level, appears to have been peculiarly unstable, so that from time to time the swamps which were formed on these plain lands were lowered beneath the waters, and their accumulations of peaty matter were buried beneath layers of sand, gravels, and mud, after a while to be again elevated and reconverted into swamps. By these successive movements the peaty matter, which has gradually been converted into coal, was imbedded in the rocks of the Carboniferous period. In the time when the Triassic rocks were formed there came one of the greatest periods of mountain-building which the continent has experienced. The ranges of the Alleghany system, extending from near New York to Alabama, were uplifted, and about the same time the region of the Cordilleras or Rocky Mountains underwent extensive elevation. Coincident with these movements the great central trough of

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the continent, now occupied by the rivers of the Mississippi system, rose so far above the level of the sea that North America took on something like its present outline.

Until the close of the Carboniferous time the central portion of the continent, though occasionally and in parts above the level of the sea, had never been brought for any length of time above the ocean's level. With possible exceptions there appears always to have been a sinus or strait connecting the waters of the northern and eastern ocean with the Gulf of Mexico. During the Jurassic and Cretaceous periods a northward extension of the Gulf of Mexico more or less constantly occupied a portion of the continent lying to the east of the Rocky Mountains, and perhaps extending to near the Mississippi River. It is not certain that this sea extended to the Arctic Ocean, but it probably united the waters of the north and south for a portion of these ages. A further elevation of the continent occurring in the later Cretaceous time reduced this great central bay to the state of very extensive fresh-water lakes, which formed a fringe along the eastern border of the Rocky Mountains. These basins were gradually filled with the waste from the neighbouring highlands; and, with the slow uprising of the continent which occurred in the later Tertiary time, the rivers which drained them carved their ways to such depths that these remnants of the continental seas disappeared. To these same relatively recent elevations we owe the uplift of the great southern plain about the Gulf of Mexico which reduced the old American sea to its present narrow limits in the gulf just named.

The elevations which took place during the Tertiary period were in the eastern part of North America unattended by any considerable crumpling or folding of the rocks, such as produces mountains. In the western portion of the continent, however, the mountain-building forces, from the beginning more constantly active than in the eastern district, profoundly affected the topography of the surface. This greater intensity of mountainous growth in the western portion of North America was attended by a development of volcanic activity in that part of the continent. In the region east of the Mississippi this form of geological activity has not been distinctly manifested since the Triassic time.

The last great geological accident of North America consisted in the wide-spread extension of glaciers, which in a relatively very recent time occupied the surface of the country from the high north to the central portions of the United States, covering the greater portion of the land as far south as the parallel of 40°. Although this visitation of the ice occupied a relatively brief period, it greatly affected the surface of the country, and has had a profound influence upon the character of its soils. During the glacial period the surface of North America appears to have been subjected to remarkable oscillations of level—at least in the district east of the Mississippi River—the northern portions having sunk down, probably in consequence of the burden of ice laid upon them, while the southern parts were correspondingly elevated. At present, the ice having recently passed away, the form of the continent appears to be undergoing some readjustment, a considerable portion of the Atlantic coast in the region south of New York being in process of down-sinking.

The geological resources of the United States include a greater variety of economically valuable substances than has as yet been found within an equal area in the other parts of the world. Most of these may for convenience be classed as carbonaceous materials, metalliferous substances, and architectural materials. The first group includes the varieties of coal, petroleum, and the burnable rock gases. These three classes of substances exist in remarkable quantities in the United States, particularly in the region to the east of the Mississippi River. Probably nine-tenths of the workable deposits of carbonaceous material contained in North America lie in the district between the Blue Ridge Mountains and the Mississippi River. As there are no considerable coal-fields in the Canadian Dominion or in the countries which lie to the south of the Federal Union, it follows that the United States possesses by far the greater part of the subterranean fuels which the continent contains. The Appalachian coal field, together with the somewhat detached area lying in western Kentucky and the southern parts of Indiana and Illinois, contains over 60,000 sq. m. of workable coal-deposits. In the western portion of the country there are a number of small coal-basins, mostly formed in later ages than the Carboniferous, which afford fuels of lower grade than those obtained from the true coal-measures, and which are of only local importance. On the Atlantic coast to the east of the Appalachian Mountains there are several small coal-fields, of which those about the Gulf of St Lawrence and about Narragansett Bay in the states of Rhode Island and Massachusetts are of Carboniferous age, while those near Richmond, Virginia, and in the valley of the Dan River, North Carolina, were formed in the Triassic time. By far the larger part of the fields have the fuel in the ordinary bituminous state. Some small areas in the mountain-built districts afford anthracites varying in quality from excessively anthracite coal, such as is found in the Narragansett district, to materials which verge on the bituminous state. The coals found in the Cordilleran region, especially those deposited in the later geological ages, generally belong to the group of lignites. The coals of the United States possess the advantage that they are prevailingly of excellent quality, being especially well suited for use in smelting ores, and they generally lie in positions where they may be mined by means of horizontal galleries penetrating from the neighbouring valleys.

The strata containing economically valuable deposits of petroleum lie in the rocks between the Cambrian and the Carboniferous, though there are some small basins which afford rock-oils in the more recent beds of the Cordilleran mountain district. The greater part of these burnable fluids is obtained from the horizontally stratified rocks lying in the valley of the Ohio River. In this field the product is obtained from a number of distinct areas, where the decomposition of the organic matter buried in the rocks at the time of their formation has produced the petroleum, and where the physical condition of the strata has led to the safe storage of the material in the strata. The range in quality of the American petroleum is great, some of the fields yielding oils of a light nature, others producing forms of the substance suitable for lubricating machinery.

The rock gases of a burnable nature, which were formed under substantially the same conditions as those which led to the production of petroleum, are somewhat more widely distributed than the fluid materials. They occur wherever rocks rich in organic matter, and in which the gases are produced, are overlaid by impervious strata. The beds where these gases have been proved to exist in economically important quantities extend, though not in a continuous way, from central New York southward and westward through the Ohio valley. Similar deposits, though as yet of unknown value, exist in the more western portions of the country. The utilisation of natural gases for lighting and heating is an industrial feature which is almost peculiar to the United States.

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The most important metallic resources of the United States are found in its iron ores. These exist in great quantities in various parts of its territory. On the Atlantic slope north of New York City the only important deposits lie in the valley of the Hudson, and are mainly magnetic oxides. In Virginia, and thence southward in the Appalachian mountain-system to central Alabama, there are very rich beds of limonite ores which lie in the horizons of the Cambrian. Farther to the west the rocks of the Clinton epoch in the Upper Silurian age contain some layers of limonites and hematites, which are remarkably continuous deposits extending with few breaks from Lake Ontario to Alabama. In the northern part of the field these deposits rarely exceed a foot in depth, but they thicken to the southward until, in the region beyond the Tennessee River, they often have a depth of from 10 to 20 feet. The portion of the Appalachian iron-field from the Potomac southward has the advantage that the ore-beds lie near to coals which afford excellent coke, and are in the immediate vicinity of limestones which are well suited for fluxing purposes. It is characteristic of these southern ores of iron that they are rarely in the form of magnetic oxides, and that they are prevailingly too phosphatic for the manufacture of steel by the Bessemer process, though they are well suited to conversion by means of the basic method of reduction. In the region about the western extremity of Lake Superior, particularly in the states of Wisconsin, Minnesota, and Michigan, there are very extensive deposits of high grade iron ores, principally magnetites, which, though occupying a much smaller field than those of the Appalachian district, have been for years the seat of the most extensive production of iron ore in the country. These beds appear to be in strata lying between the true Laurentian and the Cambrian deposits. Owing to the fact that coal is lacking in this district, almost all the ores are shipped away to the regions in the south and east where coke from the Appalachian coal-fields may be had. Most of the ores from the Lake Superior district are used for the manufacture of iron which is to be converted into Bessemer steel, while the ores from the Appalachian field serve in the main for the qualities of iron used for ordinary castings. In the region of the Cordilleras there are very great deposits of iron ore which occasionally, as at Leadville, are associated with the precious metals; but as yet these iron-fields have been but little explored.

The next most important metal in the United States is copper, which is widely distributed both in the metallic state and in that of ores. In the older rocks of the Appalachian Mountains it occurs in mineable quantities at a number of points from central New Hampshire to eastern Tennessee. Formerly the production from these mines of the eastern mountain-system was considerable; but the copper district of Lake Superior, which is limited to a small field in northern Michigan, has since the decade 1860–70 been the principal seat of production of this metal in North America. It is an eminent peculiarity of the mines in this region that they afford the substance in the metallic state: sometimes it occurs in the form of very great sheets of an indistinctly lens-like form, each of which may contain scores or even hundreds of tons of the metal. The deposits occur in rocks which were formed in Cambrian or perhaps in earlier times, and they lie in beds of conglomerate, or in accumulations of volcanic ash. At various points in the Cordilleran region, particularly in Montana and Arizona, there are deposits of copper ores which have been accumulated in wide veins, and which contain small amounts of gold and silver. Although the production of the metal from these ores is more costly than in the case of the mines of Lake Superior, these fields of the Rocky Mountains are very productive, and vie with those of Michigan in their contributions to the market.

Lead ores, mainly in the form of galena, occur in great quantities and with a wide distribution in the United States. The easternmost region which has yielded a considerable supply is in Iowa and Illinois, where the mines of this metal were in the middle part of the 19th century of much importance, though they have been rendered almost valueless by the cheaper production in the more western states. In Missouri galena occurs in large quantities commingled with zinc blende, and is produced in considerable quantities. But the present source of supply is mainly from the silver-bearing lead ores in the Rocky Mountains. Many great vein deposits in that district consist of lead ores which contain a sufficient amount of silver to make them profitable for the precious metal alone, so that the lead is produced as a by-product and practically without cost. The ores of zinc occur in economically valuable quantities in the Appalachian district south of New York, in Missouri, and at various points in the Cordilleras.

We have now noted the most important of the grosser metals which occur in economically valuable quantities in the United States. The following named, however, deserve mention because of their incidental value in the arts. Oxide of manganese is found in workable quantities at various points in the southern Appalachian district, in western Arkansas, and at various places in the Cordilleran region; iron pyrites in numerous large veins in the Appalachian and Rocky Mountain districts, the ore commonly containing a share of copper, and not unfrequently some gold; and the ores of tin at many points in the older rocks of the eastern and western mountain-systems, but so far not in conditions to have any commercial value—although recent discoveries appear to indicate that the metal may occur in quantities sufficient to repay mining in the Black Hills of South Dakota. Nickel has been mined in Pennsylvania and in Oregon, the last-named region giving promise of a considerable production. The country has a full share of the world's gold and silver, and platinum occurs, though it is not yet economically valuable. In the Appalachian region ores containing silver in quantities to profit the miner are unknown. Gold-bearing rocks are there widely distributed, but the veins containing the metal are commonly lean, and the mines opened on them have been unremunerative except in the region south of the Potomac, where during the slave-holding time a considerable amount of gold was produced by the use of this cheap labour. Gold and silver occur in conditions to tempt the miner in the region about the west end of Lake Superior; but, though some of the deposits have been temporarily productive in former years, the efforts to win these metals in this district have on the whole been unremunerative. From the eastern face of the Rocky Mountains westward to the Pacific coast deposits of varied character containing silver and gold are extremely abundant. In fact this portion of the Cordilleran region appears to be the richest in precious metals of any equal area in the world. The silver of this district generally occurs in combination with galena, and has thus been won so cheaply and in such quantities as greatly to lower the price of the metal in the world's markets. The gold of this region occurs partly in ordinary lodes of varied character, and partly in deposits of gravel, sand, and clay, which occupy extensive areas in the river-valleys, especially in the state of

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California. Although in all countries where gold has been mined more or less considerable portions of the metal have been won from alluvial deposits, these auriferous gravels of the Cordilleran district have attained an economic importance unknown in any other country, and have become the seat of a peculiar kind of mining known as the hydraulic process (see GOLD). So extensively was this hydraulic mining carried on that the beds of the rivers in the lowlands became filled with the debris which was thus washed into them, and the sands overflowed wide areas of tilled land. On this account it has been found necessary in California to limit its practice by law.

Not only the existing river-valleys of the Cordilleran region contain gold-bearing gravels, but many ancient stream beds, which were filled with lava by volcanic eruptions and have since been left by the down-wearing of the country high above the drainage level, also contain deposits of the precious metal commingled with alluvial material. The precious metal deposits of the Cordilleras differ in an interesting way from those of other countries. The Comstock lode of Nevada is not only remarkable for its great width and the surprisingly rich though widely separated pockets of ores of gold and silver which it afforded, but also for the extraordinarily high temperature which is encountered at from 1000 to 2000 feet below the surface. Although this heat is variable in different parts of the mine, it occasionally amounts to more than 120° F., making the work of mining extremely costly. In Nevada and elsewhere ores of silver, and less commonly of gold, are often found deposited in caverns originally excavated by the waters of hot springs, and since more or less completely filled with deposits bearing those metals.

The architectural stones of the United States, though on the whole less varied and ornamental than those of the Old World, are abundant and well suited to the needs of construction. In the eastern part of the Appalachian district, particularly in New England, granitic and other related rocks of excellent quality for building plentifully occur. The marbles of Vermont are the seat of a great quarrying industry, and are excellent for the builder's use. Similarly extensive deposits occur in north-western Georgia. In this Appalachian section also occur many deposits which afford good roofing slates, and the sandstones of Triassic age are well suited for architectural work. In the central parts of the Mississippi valley the unmetamorphosed strata of Palæozoic age afford many varieties of limestone and sandstone which are serviceable for building purposes. In the Cordilleran district we find the richest field for the quarrymen which the continent affords. In addition to the more ordinary varieties of building stone, there are many species of volcanic rock which are admirably adapted for constructive purposes, being easily worked, enduring, and of pleasing colours.

The varieties of clays used for making bricks of various kinds, and for pottery purposes, abound throughout the districts between the western portion of the Mississippi valley and the Atlantic seaboard. Certain clays found near Milwaukee produce, under skilful burning, brick of a very delicate buff colour. The refractory clays suited for resisting high temperature are very abundantly developed, especially in the rocks of Carboniferous age. Their frequent occurrence in this formation is due to the fact that the earth had the lime and other basic materials which cause ordinary brick to melt removed by the action of the roots belonging to the species of plants which form the coal-beds. Rocks affording cements abound in almost all parts of the country; but the product of the quarries is on the whole not as good as that obtained from similar deposits in England and Germany.

Among the most important mineral deposits of North America, and particularly of the United States, must be reckoned the phosphatic rocks which are used in the manufacture of agricultural manures. These accumulations in quantities sufficient to have a great commercial value are found in the district about Charleston, South Carolina, and in a field having an aggregate area of about 1000 sq. m. in western Florida, bordering upon the Gulf of Mexico.

Although certain precious stones have been found within the limits of the United States, none of the prized species occur, so far as is known, in quantities sufficient to have distinct economic value.

The mineral springs of the eastern part of the United States do not exhibit a great variety, and, except in Virginia and North Carolina, none of them are sufficiently warm to be prized for their temperature. Hot springs of much medicinal value occur at Little Rock, Arkansas. Their waters have a higher temperature than those of any other part of the continent east of the Rocky Mountains. In the Cordilleran district the number of mineral springs and those of high temperature is exceedingly great. As yet their therapeutic value is imperfectly known, but it seems certain that ultimately they will prove to be of much value.

EDUCATION.

Introductory.—The country at large has no national system of education. By the constitution of the United States only such powers are vested in the federal government as concern the whole people. Education is left to the states. The central government has contributed greatly and in many ways to the encouragement of schools and the integration of systems, and toward unifying the educational policies of local authorities. It has influenced the direction of educational thought, and fixed the character of educational institutions. It possesses, however, neither legislative nor administrative power to improve schools directly. The schooling of the Indians and special education to fit for service in the army and navy only have been made a charge of the nation. There is maintained at the capital, however, as a division of the department of the interior, a 'Bureau of Education,' whose twofold function is to collect statistics and to diffuse information. Based upon the information voluntarily returned to it by local and state authorities, it issues an annual report, special reports upon educational questions, and numerous minor bulletins and 'circulars of information.'

By the general government also there is administered at Washington the Smithsonian Institution (q.v.); and still further, the federal government liberally supports special scientific inquiry, through the coast, geographical, and geological surveys, the Signal Service (or weather) Bureau, frequent naval explorations, and a national observatory, besides numerous publications of a scientific or historical character, incidentally connected with one or another of the several departments. And finally, under the provisions of the 'Ordinance of 1787,' granting to each state organised thereafter section 16 in every township for school purposes; and by an Act of 1849 setting off 500,000 acres to each of certain specified states; and again by an Act of 1862 giving to each state 30,000 acres of land for every representative in congress, to be used in establishing schools of agriculture and the mechanical arts, land has been appropriated by the national government for purposes of education in the states, aggregating nearly 80,000,000 acres.

All educational systems in America are relatively recent. Except for some New England

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attempts made in Massachusetts by the law of 1647, and under the Connecticut Code of 1650, no effective movement for general education was inaugurated in the United States prior to the 19th century. In a few states permanent educational funds (hinting at centralisation and state control) were begun just after the revolution. But not until 1812 (in New York) was any law passed that could be construed as contemplating a uniform system for an entire commonwealth. That of Massachusetts, as now in force, dates from 1837. The Michigan system is a year older. Connecticut organised in 1838, and Rhode Island in 1843. But for the country at large the period of growth and the integration of systems, and the centralisation of control, includes little more than the years since 1870. Closer supervision, the improvement of teachers, the revision of school courses, the introduction and multiplication of technical and trade schools, the adoption of the Kindergarten, and the marvellous development of free schools in the southern states belong wholly or chiefly to this period.

The public school system now is practically co-extensive with the nation. Theoretically, the state agrees to furnish schooling for all who seek it (restricted as to age only), schooling of any grade to any class, with free tuition in some states even through the university. But other agencies also have the right to conduct schools, with or without the sanction of the state authorities. Their management (whether private or parochial) is free from state oversight; it passes upon the qualifications of, and employs, its own teachers; it determines its own courses and text-books; it is required to make no reports; in short it is regarded in every respect by the civil authorities as a private enterprise, and treated accordingly.

Denominational Schools, &c.—Among the earliest of educational agencies in every section has been the church: not unfrequently the first schools among the pioneers have been veritable home missions. But now elementary denominational schools are neither numerous nor largely attended. Most Protestant sects patronise the public system; five-sixths of all the 700,000 children attending the parochial schools of all the states are Catholics. Of 1324 non-public secondary schools reporting to the National Bureau 548 are church controlled, and enrol nearly 90,000 pupils. But as an educational agency the church shows greatest zeal in establishing higher institutions of learning: of 506 colleges entitled to grant degrees 382 are avowedly denominational. There are also (approximately) 200 superior institutions, independent of both church and state, some of them endowed, varying greatly both as to quantity and quality of work, empowered to grant degrees. Of the eight colleges of the first class for women seven are private foundations, and enrol more than 2000 students. Of the 114 degree-giving institutions for women included in the second class 59 are private organisations, and have an attendance of about 9000 students. Of the 12 university foundations five are independent corporations having 6000 students. Sixty-one of the 384 colleges for men alone or co-educational for the sexes are private, and enrol 10,000 students. In addition to these still, there are 32 independent schools of science with 8000 students. In the aggregate the private institutions for superior instruction number 164, with an annual membership of 35,000 students.

Public (State-controlled) Schools.—The schools of all grades enrol approximately 14,000,000 pupils. Of this number nearly 12,500,000, or 90 per cent., belong to public institutions; the remaining 10 per cent. to denominational and private schools. Moreover of those in the public schools 96 per cent. are in the elementary grades (six to fourteen years of age); 31·2 per cent. in the public high schools, or preparatory departments; and about one-fourth of 1 per cent. in the state colleges and universities, including students in the public technological schools. The first two of the grades mentioned constitute the 'Common School System' of the states, tuition in both of which is free. In most states admission to classes beyond high schools involves the payment of a small fee, though most of these institutions have some endowment, and, in addition, most receive periodical appropriations from the legislatures that created them. The total appropriations average perhaps not less than a million dollars annually; the income from all other sources being about twice that amount. The endowment for all such institutions organised since 1800 began in the Federal Act, 1785, granting out of the public lands one full township (later two) to each state for the establishment and maintenance of a 'Seminary of Learning.' This as a nucleus has been variously managed by the different states, and sometimes increased through special appropriations, &c. Although the schools of this group comprise but one-fifteenth of all the superior institutions of the country, they enrol one-sixth of the students. The state agricultural and mechanical schools have all grown up since 1865, taking their rise in the grant by congress in 1862. Upon this foundation, enlarged by individual donations of land and funds, by bequests and state grants, there are twenty-six independent schools having an aggregate endowment of something over $10,000,000, with a property holding of farms, machinery plants, and buildings valued at $7,000,000 more.

Professional Schools.—Among the professions medicine ranks first in number of schools (188), theology second (141), and law last (52). The schools of theology have nearly 7000 students, and represent 27 different denominations. In the 52 schools of law are 4000 students, and in medicine (including surgery, dentistry, pharmacy, and veterinary science) there are as many as in theology and law combined. Of the 52 law schools 18 are state supported, and of the medical schools 37. There should also be mentioned 33 schools for nurses, representing fourteen states, twenty-two cities, and 1248 students. The courses average two full years in length, from which are graduated annually over 400 nurses.

Supplementary Institutions.—There are 74 schools for deaf-mutes, with 8156 students; 33 schools for the blind, having 3134 students; 26 schools for the feeble-minded, with 4784 pupils; and 50 reform schools, with 19,790. These schools for the defective and wayward classes are found in almost every state, are generally public, and represent an aggregate annual expenditure of five and a half million dollars. Evening schools are maintained more or less regularly and successfully in 150 cities. Half as many cities sustain Kindergartens, public or private. The support of these latter is, in most cases, an experiment only, though Boston, Philadelphia, St Louis, and a few other cities include them in the common school system, and provide for all alike. Here, as in so many other educational interests, private enterprise and church zeal have taken the initiative. The present total enrolment perhaps reaches 25,000.

Common School Statistics.—The lowest minimum age is 4 years, the highest 8, the average 5·5 years; the lowest maximum age 15 years, the highest 21, the average 19·7 years; the average school period 14·2 years. The highest ratio of school census to population is 22·9 per cent., the lowest 11·4 per cent. The accompanying table presents the population of the United States for the three census years 1870–80–90, together with the school enrolment for

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each year, its ratio to the total population, and the school attendance:

Year.	Population.	Enrolment.	Per cent.	Attendance.
1870	38,558,371	6,871,522	17·8	4,077,847
1880	50,155,783	9,867,566	19·7	6,144,143
1890	62,640,335	12,697,196	20·3	8,144,988

The brief period in the year during which the schools are open detracts greatly from an otherwise efficient system. The average for the entire country is a little less than 136 days—i.e. between six and a half and seven months. The shortest state average is 63·4 days; the longest, 189 days. The unsatisfactory condition of many rural schools may be inferred from the fact that the average length of term in 638 cities of the country is a fraction over 188 days. The general average attendance for all the states is 87·6 days. This means that the real efficiency of the system is diminished by nearly fifty days. The lowest average attendance for any state is 39·2 days; the highest, 139·4.

Finances.—The gathering of school moneys is, in most states, a comparatively simple matter, though their origin is quite diverse. All the income, however, may be grouped under one or other of three classes: (1) that from permanent funds; (2) that from state taxes; and (3) that from local taxes. There are in certain sections occasional appropriations made to the common schools, to be expended within the year; as is more frequently done for the state's higher institutions. In a few localities subscriptions, as in the earlier colonial days, may even yet be found. Among the most notable of endowment moneys for common schools, though forming but a small percentage of the aggregate sum, are the gifts and bequests that have been set apart in certain sections of the country. Such are the Peabody (q.v.) and Slater ($1,000,000) funds. In some states the public funds have been created or increased by legislative appropriation, as in parts of the south; and again, by the investment of the surplus revenue deposit made by the general government in 1837. In most states escheated moneys and lands and forfeitures go to swell the permanent school funds. For a hundred years the vast 'public domain' has been a source of constant revenue (this has been greatly reduced in recent years), 3 to 5 per cent. upon all sales being turned into the treasuries of the states interested. This in a dozen states was diverted to education, and became the means of increasing the investments for common schools in those states having public lands. At various times, also, the federal government has made grants of land to the states without specifying their use, but which have frequently been set apart to the schools. So that, with the section 16 set apart in every township, the states altogether have received from the federal government not less than 75,000,000 acres of land, most of which has been used in the interest of elementary education. The total permanent funds for all the states, from whatever source, amount to about $130,000,000, and yield annually over $8,000,000 of income. Then, in most states, the school revenue is increased annually by a general tax upon property, to which in some states is added a poll-tax. The two yield annually, in the entire country, more than $25,000,000. The third, and much the largest source of revenue, is in the collections from taxes assessed by local authorities, upon local properties, for the benefit of the schools of the locality. These alone aggregate from $85,000,000 to $90,000,000 annually. From all the sources the total yearly income is about $130,000,000. Based upon the average attendance in the schools, the revenue raised per capita is $16·50; the highest average for any state is $45·84, the lowest $3·16.

Expenditure.—Of the aggregate annual expenditure ($130,000,000) about $90,000,000 goes for teaching and supervision. This represents an annual expenditure per capita of total population of $2·17. The highest per capita is reported from California, $4·35; the lowest from South Carolina, 41 cents. The total expenditure for the entire country, further, is 5·6 mills to each dollar of property valuation. The highest rate per assessment is in Nebraska, 18·7 mills; the lowest in Georgia, 2·5 mills. The total estimated value of school property is $350,000,000, with an annual addition of more than 20 millions.

Teachers.—The number of teachers in common schools increased from 200,515 in 1870 to 363,935 in 1890. If we included those in private and higher institutions the aggregate would not be far from 400,000, the superior and professional schools alone having a teaching force of nearly 15,000. Of the common school teachers 238,333, or 65·5 per cent., are women. In 1880–90 the proportion of men diminished nearly 8 per cent. Throughout the southern and central states the ratio of male to female teachers is highest; in the east, including New England, lowest. In Arkansas more than 73 per cent. of the teachers are men; in Massachusetts, 8·9 per cent. The average salary of teachers for the country at large is about $37·00 per month—for males, $42·43; for females, $34.27. The highest state average for male teachers is in Massachusetts, $108·88 per month; the highest for females in Nevada, $67·65. The lowest for males is in North Carolina, $24·57; the lowest for females in Maine, $17·24. Concerning the qualifications of teachers, it may be said there is no attempt at a uniform standard among the states, and in most states little effort that is effective toward supplying the schools with trained teachers. Much has been done, however, in the past, and the present shows even more noticeable improvement in the character of teachers and the teaching: 129 public normal schools report 22,618 students, 71 in every hundred of whom are women; 42 private normal schools contain 4781 students, 56 per cent. women; 58 cities possess local training schools, with nearly 1000 students; and a dozen higher institutions have departments or chairs of pedagogy. All this, however, means provision for the training annually of less than one-tenth as many teachers as are needed to supply the common schools, and the great majority of the 364,000 elementary teachers are relatively untrained. Nevertheless, while most teachers have had little or no systematic instruction in professional subjects, teachers' institutes, associations, and reading circles are used in a very effective way to familiarise them with their work.

Elementary Courses of Instruction.—Notwithstanding great diversity, the common school course is essentially the same throughout most states. Reading, writing, arithmetic, geography, United States history, English grammar, spelling, and physiology make up the major part of all elementary courses. Few of these are anywhere omitted, though in some schools other subjects are added. Most frequent among the latter are vocal music, drawing, elementary science lessons, and in a few cities manual work. Tuition in these is free to every child of school age. The greatest diversity appears in comparing the courses of urban and rural schools; the shorter terms, crowded classes, imperfect gradation, and the conservative habits of country districts greatly abridge the work in their schools. In cities the average length of the elementary course is eight years, of thirty-nine weeks each. Seven hundred cities reporting upon this point show an average aggregate of work required in the eight years to be 6433 hours.

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Among these cities the average time given to language subjects is 48·6 per cent. of the whole; that to mathematics is 24·8 per cent.; to science, 11·3 per cent.; and to history and kindred subjects but 4·3 per cent. The remaining 11 per cent. is given to sundry branches, as moral instruction, music, drawing, physical culture, scattering attempts at manual training, &c.

Manual training can scarcely be said yet to have found a place in the public common school system. Some attempt was made as early as 1870 in Springfield, Massachusetts, to introduce it, and other cities have since tried it with varying success. At present no less than thirty systems, representing a dozen states, report 80,000 children of elementary and high school grade together receiving training through manual industry by specially fitted teachers. There are also fifteen private, independent manual training schools in nearly as many cities, established, with a single exception, since 1880, and enrolling about 4000 students. These latter rank with the public, high, and other secondary schools, admitting pupils (mostly boys) at fourteen years of age to a course averaging three years, and comprising both literary and industrial studies. In schools for the deaf and blind, the feeble-minded and the wayward, and the homeless poor the chief instrument of instruction is manual training.

GENERAL STATISTICS.

The figures in this section, wherever no date is given, refer to the census year 1890. The first census of the Union was taken in 1790, when it comprised thirteen states; in 1820 there were twenty-three states and three territories; in 1860 thirty-three states and five territories; in 1880 thirty-eight states and nine territories; in 1890 forty-four states and five territories, including Oklahoma, but not either the District of Columbia or Indian Territory. The following table shows the population of the republic till 1880, exclusive of Alaska and Indian Territory: for 1890, see p. 373.

Year.	White.	Free Coloured.	Slave.	Total.
1790	3,172,006	59,527	697,681	3,929,214
1820	7,862,166	233,634	1,538,022	9,638,822
1860	26,922,587	488,070	3,953,760	31,443,321 *a*
1880	43,402,970	6,580,793		50,155,783 *b*

a includes 44,021 civilised Indians and 34,933 Chinese.
b " 66,407 " 105,613 "

In 1880, 13·3 per cent. of the population was foreign-born, 41·5 per cent. of these being from the United Kingdom, and two-thirds of these again from Ireland. In 1880 there were forty-five, in 1890 seventy-four, cities with over 40,000 inhabitants; in the latter year 29·12 per cent. of the entire population lived in 443 towns of above 8000 inhabitants. There is no state church in the United States. In 1890 the Roman Catholics claimed to have over 6,250,000 of the population; next in number come the Methodists, with nearly 5,000,000; the Baptists, with about 4,300,000; Presbyterians, 1,230,000; Lutherans, 1,086,000; Congregationalists, 492,000; and the Episcopal Church, 480,000. Nearly one-seventh of the people are actively engaged in agriculture. The public lands yet undisposed of in 1890 embraced 1,815,504,147 acres, of which Alaska contained 369,529,600 acres unsurveyed. The following table shows the details of the cereal crops for 1889.

	Acres.	Bushels.
Maize	72,076,074	2,124,559,312
Wheat	33,574,341	468,306,778
Oats	28,297,272	809,198,797
Barley	3,221,099	78,349,602
Rye	2,171,022	28,422,354
Buckwheat	838,777	12,130,668
	140,179,185	3,520,967,511

Add to this 162,040 acres under rice, producing 130,845,392 lb., valued at $3,983,464. The acreage under cotton was 20,100,019, and the production 7,434,487 bales; under hemp, 25,054 acres, yielding 11,511 tons, valued at $1,102,602; under flax, 1,318,698, yielding 10,250,410 bushels of flaxseed, and the total produce of seed, fibre, and straw being valued at $10,436,228; under hops, 50,212 acres, yielding 39,171,270 lb., worth $4,059,697; under tobacco, 692,990 acres, producing 488,255,896 lb., valued at $34,844,449; under sugar-cane, 274,391 acres, yielding 302,745,245 lb. of sugar, of a value of $12,809,610. Moreover, the crop of maple sugar was 32,952,927 lb., worth $2,696,692, and the cane molasses 25,196,567 gal., of value $8,073,981, while 2,258,376 gal. of maple syrup was valued at $1,973,836. The numbers of cattle, &c. in the United States in 1890 were given as cattle, 52,801,907; sheep, 44,336,072; swine, 51,602,780; horses, 14,976,017; mules, 2,246,936. The first three figures are, however, only estimates. The total value of farm animals exceeds 2300 million dollars; and the area devoted exclusively to the rearing of cattle is about 1,365,000 sq. m. Of wool 276,000,000 lb. was produced; of butter, 29,748,042 lb. ($4,187,489); of cheese, 95,376,053 lb. ($8,591,042). Over 400,000 acres are under vines (half in California alone), producing 24,000,000 gal. of wine and (in California) 27,443,900 lb. of raisins. For the forests, see TIMBER. The following table indicates the leading features brought out as to manufactures by the federal censuses of 1870–80.

	1870.	1880.
No. of establishments	252,148	253,852
Hands employed—males	1,615,598	2,019,035
" " —females	323,770	531,689
Children and youth employed	114,628	181,921
Capital invested	$2,118,208,769	$2,790,272,606
Total wages paid	$775,584,343	$947,953,795
Value of materials	$2,488,427,242	$3,396,823,549
Value of product	$4,232,325,442	$5,369,579,191

It should be borne in mind that the values given for 1870 are for gold at 25·3 per cent premium. In the foregoing table the value of manufactured products as given is the gross value. The net value—i.e. the value of products after deducting the value of the materials consumed—is for 1870, $1,395,118,560; for 1880, $1,972,755,642.

About forty great industries, the least producing over $30,000,000 per annum, represent over 75 per cent. of the total manufacturing interests of the country. The census for 1890 shows an increase in the textile industries over that of 1880 amounting to nearly $200,000,000, the total value of the product being $693,048,702; the pig-iron industry reached a total of 9,579,779 as against 3,781,021 short tons; the production of steel in the form of ingots and direct castings aggregated 4,466,926 as compared with 1,145,711 short tons in the year 1879–80, and of these the product of Bessemer steel rails had increased in the decade from 741,475 to 2,036,654 tons. The total value of the manufactured products of the United States in 1890 may be set down meanwhile as not far below $8,000,000,000. Under minerals, the metallic products show advance in 1889–90 from $269,391,487 to $307,334,207, and the non-metallic products from $307,882,575 to $335,009,190, or, as a total, from $587,474,069 to $642,343,397, to which $10,000,000 is added in the official report as the estimated value of unspecified mineral products. The principal items are pig-iron ($151,200,410), bituminous coal ($110,420,801), silver ($70,464,645), Pennsylvania anthracite coal ($61,445,683), and building stone ($54,000,000). In 1890 there were in the United States over 2000 miles of canals; of railways, 163,579 miles; of telegraphs, 202,143 miles (760,660 miles of wire); and of telephones, 240,412 miles

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of wire. For fisheries, see under that head; also SALMON, SEAL, &c. The imports and exports from 1879 to 1891 show a remarkable advance—the former from $445,777,775 to $844,916,196 (1892, $827,391,284), and the latter from $698,340,790 to $872,270,283 (1892, $1,015,789,607); specie is not included under either head, and requires the addition in the latter year of $36,259,447 to the imports and $108,951,462 to the exports. The chief trade is with Great Britain, which receives more than half of all the exports, and supplies about a fourth of the imports. The leading exports are cotton, wheat and flour, meat and dairy products, and mineral oils; the principal imports, sugar, coffee, iron and steel manufactures, flax, hemp, jute, and their manufactures, chemicals, and woollen and cotton goods. Foreign commerce of recent years has been carried on largely in foreign bottoms, but efforts are now being made to increase the United States mercantile marine. In 1891 there were registered in the republic 17,683 sailing-vessels of 2,668,495 tons, and 6216 steam-vessels of 2,016,264 tons; 988,719 tons was the burthen of all ships engaged in the foreign trade, but this was an increase of 60,657 tons on 1890. The navy has been to a great extent reorganised, and in 1891 comprised, besides old vessels, &c., fourteen ships in commission and twenty-three building; the latter include five armoured battle-ships (the two smallest of above 6300 tons displacement, had been launched), an armoured cruiser, and an armoured ram, while the former were mostly steel cruisers. The service has, besides 726 officers, 7500 enlisted men and 750 boys; and there is also a marine corps of 2177 officers and men. The standing army is limited to 25,000 men, and its strength, exclusive of officers, and the signal and hospital corps and general service clerks and messengers, is usually very close upon that number. The militia is supposed to comprise all men in each state, from eighteen to forty-five capable of bearing arms; the organisation is perfect only in a proportion of the states, but the returns show 8312 officers and 106,269 men. See ARMY, and NAVY. Indoor paupers (for whom alone there are proper statistics) numbered 66,203 in 1880, and 73,045—34,791 of them native-born—in 1890. In 1880 there were 35,538 convicts in penitentiaries; in 1890, 45,233—12,842 born of native (both) parents. The numbers in juvenile reformatories rose in the same period from 11,468 to 14,846. The federal revenue ranged in the years 1880–91 from $323,690,706 to $403,525,250, and the expenditure from $242,483,138 to $365,773,905, each year showing a surplus, and often a heavy one. In the same period the public debt was reduced from $2,120,415,370 to $1,610,620,103. The total of the state and county debts throughout the Union reached in 1890 $365,058,728. In 1891 there were 3677 national banks, with a capital of $3,213,100,000.

See articles on Canal, Cotton, Great Britain and statistics there, Iron, National Debt, Patents, Pensions, Railways, Shipping, Steel, Sugar, Telegraph, Tobacco, Wheat, Vine, Wool, &c.; Bishop's *History of American Manufactures* (1864), and the *Industrial History of the United States*, by Albert S. Bolles (Norwich, Conn. 1881); the United States Census Reports from 1850 to 1890; and the *Statesman's Year-Book*, &c.

HISTORY.

England claimed the greater part of North America by right of the discovery of John Cabot in the summer of 1497. The first permanent settlements, however, were made by the Spaniards in Florida, and by the French on the banks of the St Lawrence. The later half of the 16th century witnessed a great and sudden expansion of England's sea-power. The defeat of the Armada made the seas vastly safer for the navigator, and rendered improbable another Spanish attack like that of Menendez (1565) on the French Huguenots in Florida. A sudden plunge into speculative ventures brought disaster in its train, and it is to this commercial distress of the early years of the 17th century that the planting of the first permanent English colony was due. Sir Walter Raleigh (q.v.) sent out colonies in Elizabeth's time, but the name Virginia is all that remains to remind one of his vast schemes. In 1603 his rights reverted to the crown, and in 1606 the Virginia Company was chartered to make good England's claims to the American land. Virginia, as defined in this charter, extended from 34° to 45° N. lat. Two sub-companies were provided—one, with headquarters at Plymouth, to settle the northern part; the other, with an official residence at London, to settle the southern portion. In April 1607 the London company founded the first permanent English colony at Jamestown, on the James River, near Chesapeake Bay. The English were then only learning the art of colonisation, and most of those who came to Virginia during the first half-dozen years of its existence starved to death. But others took their place, and the success of the plantations was ere long assured. There are few more astonishing phenomena than the rapid spread of the tobacco habit; before 1615 the demand was sufficiently great to ensure the permanence of Virginia. The early colonists were men, but the company encouraged the immigration of marriageable girls, and soon the settlers were bound to the soil by ties of family responsibility. Labour was still scarce, but in 1619 that problem was solved, for the time at least, by the introduction of negro slavery; though as a commercial venture the company was a complete failure. In 1619 the London company inaugurated a new era by granting a modified form of self-government to the colonists.

The next permanent settlement was made farther north by a band of honest, religious folk, who brought their wives and children with them. Some of them had passed a few years in the Netherlands, and they all are usually known as the Pilgrims (see PILGRIM FATHERS). They settled in 1620 on the shores of a wretched tidal harbour, which was called Plymouth (q.v.). Ten years later the colony of Massachusetts (q.v.) was founded by the English Puritans, to provide an asylum for themselves and their friends in the event of the struggle in England going against them. The council for New England, as the successor to the Plymouth end of the Virginia Company was called, gave them a grant of land, which the king confirmed, whilst giving them in addition very extensive powers of government. For ten years (1630-40) a constant stream of immigrants poured into New England. It could hardly be expected that all these Puritans should think alike. Some of them, regarding Massachusetts as too liberal, settled at New Haven; while others, thinking it not liberal enough, founded the colony of Connecticut (q.v.). In 1662 Charles II. granted a charter to the people of Connecticut, including the New Haven colony. Other Puritans, whom the Massachusetts people did not like, settled Providence and the island of Rhode Island (q.v.); and these settlements were united and incorporated by charter in 1663 (see WILLIAMS, ROGER). The two last-named charters gave, in effect, self-government to the people of the two colonies. They were so liberal that the Connecticut charter remained the fundamental law of Connecticut till 1818, while the Rhode Island charter was not superseded by a state constitution until 1842. Other settlements were made by Puritans and others along the Merrimac River and the

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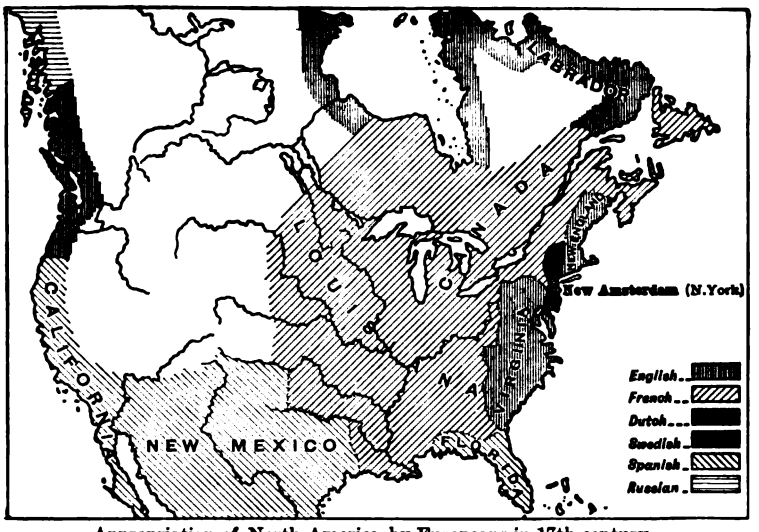
seaboard north of Massachusetts. The former were known as New Hampshire. The latter were within the province of Maine, and the rights of the original grantees were purchased by Massachusetts in 1677. Maine remained under the government of Massachusetts until 1820. In 1643 four of these colonies, Massachusetts, New Plymouth, Connecticut, and New Haven, joined together for mutual convenience and defence, under the name of the United Colonies of New England.



Appropriation of North America by Europeans in 17th century.

In 1624 the Virginia charter, by one of those arbitrary acts common during the Stuart period, was annulled, and the colony thus became a royal province. Little change seems to have been made in the government of the province, but one king after another granted away land which had been included within its charter limits. The first of these grants in point of time was made by Charles I. to his former secretary, George Calvert, first Lord Baltimore, who was a Roman Catholic. Before the patent was actually issued George Calvert died, and it was issued to his son Cecil, Lord Baltimore (see MARYLAND). Calvert's design seems to have been to found a landed estate for his family and an asylum for his fellow Roman Catholics. In both these designs he was successful, and the Baltimore family derived revenue from the province until the time of the American revolution. A toleration act for Maryland, the first in the history of the English race, was passed in 1650 by an assembly composed of both Protestants and Catholics.

During the great Civil War and Commonwealth periods immigration into the Puritan colonies almost ceased; indeed, at times the movement seems to have been the other way. Beyond requiring an acknowledgment of allegiance and obedience to the navigation ordinances, the Puritan rulers of England left the colonies to themselves, and for some half-dozen years all the colonies enjoyed self-government.

With the restoration of the Stuarts there came a revival of the colonising spirit. In 1663 Charles II. granted to Clarendon and other courtiers a vast tract lying south of the settled portions of Virginia, under the name of Carolina. The grantees attempted to introduce a fantastic form of feudalism (see NORTH CAROLINA), but the colonists would have none of it. Early in the 18th century the crown purchased the rights of all but one of the grantees, and assumed the government of the whole, the province being divided (1729) into two governments, North Carolina and South Carolina. Before long South Carolina became very prosperous, her rice supplanting that of Egypt in many markets of Europe.

The government of the Restoration adopted the colonial policy of its predecessors, and restricted colonial trade as much as possible to England and to subjects of the English crown; thus, certain goods could be exported only to England in English or colonial ships. The country bordering on the Hudson and Delaware rivers had been settled by the Dutch and Swedes, and was now in the hands of the Dutch. It was impossible to enforce these navigation laws under the circumstances, and the conquest of the Dutch colonies was resolved on and accomplished in 1664—though for a few years they again came under Dutch control. They were finally surrendered to England in 1674. Even before the conquest Charles II. granted these Dutch colonies to his brother James, Duke of York and Albany; and James, with the Stuart love of giving, re-leased a valuable portion of it to two of his friends, Berkeley and Carteret, who were also among the grantees of Carolina. In honour of James, the Dutch settlements, when conquered,

were called New York; while in commemoration of the fact that Carteret had held the island of Jersey for the Stuarts during the Civil War the portion given to him and Berkeley (1664) was called New Jersey. In 1674 these grants were renewed. New York was thus a conquered province, and the people there had none of the privileges enjoyed by the people of the colonies which had been originally colonised by Englishmen.

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The governors of New York, sensible of the grave error of the grant of New Jersey, placed all possible obstacles in the way of the grantees, and before long the property came into the hands of a syndicate of Quakers, at the head of which was William Penn. Trouble continued with New York, and the Quakers became involved in innumerable disputes about land and matters of local government. To avoid further complications the jurisdiction was surrendered to Queen Anne (1702). For a time New York and New Jersey had the same governor, though separate legislatures. In 1738 a governor was appointed for New Jersey, and thus it became a separate colony, remaining so until the revolution. William Penn does not seem to have been disturbed by the disputes of the New Jersey Quakers. He obtained from the king, in 1682, a large tract of land on the west side of Delaware, under the name of Pennsylvania (see PENN). He also obtained from the king and the Duke of York the Swedish-Dutch settlements on the western side of Delaware Bay, south of Pennsylvania. There was a long and bitter dispute between Penn and his heirs and the Baltimores as to the boundary between their possessions. A compromise was made in the middle of the 18th century, the present boundary line being run for some distance by two English surveyors, Mason and Dixon (see MASON AND DIXON'S LINE). For a century this line, known by their names, was regarded as the boundary between the north and the south. As the matter was finally determined in 1703, Pennsylvania and the lower counties on Delaware Bay had each its own legislature, but one governor. At the revolution, however, the counties set up for themselves as the state of Delaware.

The last colony to be planted was Georgia (1732). It had its origin in the philanthropic instincts of Oglethorpe, and the desire of the English government to push the southern boundary against the Spaniards. The philanthropists, however, were not good governors; one by one their schemes failed, and in 1751 they voluntarily surrendered the colony to the crown.

Toward the end of the Stuart period a scheme of colonial consolidation was set on foot. The idea seems to have been to form two or three strong colonies, governed directly from England, out of the thirteen free, weak, self-governing colonies. Charters were annulled, and all the colonies north of 41° N. lat. were formed into the dominion of New England, with a capital at Boston. Andros was appointed governor, with executive, judicial, and legislative powers, the people no longer having any political power. But the arrangement did not long continue; on the news of the landing of William of Orange at Torbay the people of Boston rebelled, captured Andros and other officials, and sent them to England for trial. Rebellions occurred also in New York (Leisler's rebellion) and in Maryland (Coode's Association).

The new English government adopted a policy of compromise. The old forms of government were generally restored, except in Massachusetts; but as an offset to these concessions the trade of the colonies was still further restricted to England. Massachusetts, which now included New Plymouth, was given a modified charter government. Under this new charter the governor was to be appointed by the crown, the House of Representatives elected by the people on a property qualification, and the council appointed by the two jointly. The governor's salary, and the salaries of the other officials, were to be paid by the Assembly. Thus the Assembly really ruled; but there were always so many disputes of one kind or another that the Massachusetts people became accustomed to opposition and schooled in political methods.

The colonies shared in the good and evil fortunes of England in the great struggle with France, which began in 1690 and continued until 1763. The earlier conflicts have little interest at the present time. But in 1745 the New Englanders, with some slight assistance from the English, besieged and captured Louisburg, on Cape Breton Island. At the close of the war, however, Louisburg was given up to France. In 1754 trouble began anew; the French endeavoured to connect their possessions in the St Lawrence valley with their settlements on the Mississippi by a chain of posts and towns on the Ohio River and its affluents. This brought France into contact with Pennsylvania and Virginia. The governor of Virginia at that time was a Scot named Dinwiddie. He sent a formal protest against the French occupation of Fort Duquesne, at the confluence of the Monongahela and Alleghany Rivers. The French paying no regard to this protest, Dinwiddie attempted to drive them out by force; but the campaign ended in disaster, Washington, the Virginia commander, and his little army being obliged to surrender at Fort Necessity. The war begun in this way soon spread over the whole frontier, and before long nearly all the nations of western Europe became involved in the struggle. In 1755 General Braddock was defeated near Fort Duquesne by the French and their Indian allies. Later, though, the fort was captured. But the principal interest in this war was in the north, where the English attempted to invade Canada by the line of Hudson River, Lake Champlain, and Lake Ontario, and towards the north-east by way of the lower St Lawrence. In 1758, after serious resistance, Louisburg was again taken from the French, this time by an English army commanded by Amherst and Wolfe. The next year Wolfe, with a strong fleet and army, sailed up the St Lawrence, and after a long investment placed his army on the Plains of Abraham, on the northern side of Quebec, just outside the walls, and there defeated the French under Montcalm. Both Wolfe and Montcalm were mortally wounded during the action. After many defeats the English penetrated by the line of Hudson River, and in 1760 captured Montreal, and thus secured the safety of Quebec. In 1763, by the peace of Paris, France gave up Canada and all her claims to lands east of Mississippi and north of Florida to England, with the exception of some small islands in the Gulf of St Lawrence and the island of New Orleans at the mouth of the Mississippi. At the same time she ceded to Spain, as the price of her unavailing assistance in the war, all her claims to lands west of the Mississippi and to New Orleans and the island on which it stands. Spain ceded to England all her claims to lands east of the Mississippi, with the exception of New Orleans; and England, on her side, restored what she had conquered in the West Indies to France and Spain, and relinquished whatever claims she might have had to lands west of the Mississippi. By a proclamation issued in the same year the king still further restricted the limits of those colonies to the Alleghanies. The Indians, formerly subject to France, proved hard to manage; a rebellion, led by Pontiac (q.v.), in 1763, convinced the English government of the necessity of keeping on foot in the colonies a force of regular troops. It seemed right that the colonists should bear a part of the burden their support entailed; and by act of parliament, therefore, a stamp-tax was laid on all the American colonies (1765). The tax was equitable enough, and it was fair that the colonists should bear a part of the burden of their protection. It did not seem right, however, that they should be taxed by an assembly 3000 miles away, in whose election

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they had had no voice, and whose members were not in any way responsible to them. At about the same time parliament also amended the Trade Laws in the direction of efficiency and simplicity, making them easier of enforcement. The points in dispute are illustrated by the arguments of James Otis of Massachusetts against Writs of Assistance (warrants authorising the holders to search for smuggled goods), and of Patrick Henry of Virginia on the legality of the king's veto of an act of the Virginia Assembly. Neither had any law whatever on his side; they based their arguments on the broad rights of the colonists as men and subjects of the English crown. Resolutions embodying the same ideas were passed by the Virginia Assembly during the Stamp Act troubles and at Henry's suggestion. So general was the opposition to the act that when the day arrived on which it was to go into operation not a stamp could be anywhere purchased. The judges even were obliged to proceed without stamps, and the customs officers to give clearances which were unlawful on their very faces. There was a change of government in England at this time, owing to the king's dislike of George Grenville, and the Rockingham Whigs came into office. Partly to discredit their predecessors, partly to conciliate Pitt (the elder), and partly because they could not help it, the Stamp Act was repealed. Pitt had a whimsical notion that parliament, though unable to levy direct taxes on the colonies, possessed nevertheless complete legislative power, and a declaratory act to that effect was passed. The colonists soon saw the futility of this distinction, and opposed the Townshend duties on glass, tea, and paints imported into the colonies. Finally, when an attempt was made to force the tea upon them, they threw it overboard or stored it in damp cellars. Parliament then suspended the charter of Massachusetts, and closed the port of Boston (q.v.).

The other colonies took up the cause of Boston and Massachusetts. The contest was really for self-government for America; the Americans maintaining that they were the equals of Englishmen living in England—not their subjects. Furthermore, they said they were not and could not be adequately represented in parliament, and hence could not be bound by its votes; the colonial assemblies represented them. These and other reasons for taking up arms were embodied in a Declaration of Independence, July 4, 1776, which was in reality the platform of the Radical party. The English view, on the other hand, was that parliament was the supreme legislative body of the whole empire, while the colonial assemblies were merely subordinate legislatures.

The contest began with the skirmishes at Lexington and Concord on April 19, 1775, followed by the battle of Bunker Hill on 17th June of the same year. From that time until March 1776 the English army was blockaded in Boston by the New England farmers, before long headed by Washington (q.v.). Finally, however, the English were obliged to evacuate Boston, and the war drifted away from New England. The British plan was to conquer and occupy important towns like New York and Philadelphia. Washington's idea, on the contrary, was to preserve his army. This he accomplished in a manner to arouse the admiration of the world. The capture of a Hessian detachment at Trenton, New Jersey, in December 1776, saved the revolution from ignominious failure, and was the turning-point of the war. The next year Howe captured Philadelphia, retaining control of New York City and the lower Hudson. Washington was obliged to retire inland to a strong position among the hills named Valley Forge. In 1776 General Burgoyne attempted to seize the line of the Hudson River, marching southward from Canada. From a military point of view this plan was an admirable one, but it left out of account the unanimous resistance of the inhabitants of New England and the people of northern New York. Burgoyne's advance was delayed in every possible way, and by the time he reached Saratoga his light troops had been destroyed at Oriskany in western New York and at Bennington in Vermont. Surrounded by the farmers of New England and New York, unable to go forward or to go backward, he surrendered, October 19, 1777.

The French, now convinced that the colonies could hold their own, entered into an alliance with them in 1778. In 1780 Clinton with a strong army sailed southward from New York, landed on the South Carolina coast near Beaufort, besieged Charleston on the land side, captured it, and overran the seaboard. He then returned north, leaving Cornwallis to continue the subjugation of the south. An army sent by Washington to oppose him was defeated at the battle near Camden in the same year, the commander of the Americans being the same Horatio Gates who had commanded the Americans during the Saratoga campaign. In the autumn of the same year, however, General Nathanael Greene took command of the American resistance to Cornwallis. In October 1780 the English irregular troops were routed at King's Mountain by the frontiersmen of Kentucky and Tennessee. In January 1781 Greene's lieutenant, Daniel Morgan, destroyed or captured Cornwallis' light troops, under Tarleton, at the Cowpens, and escaped with his prisoners. Cornwallis then pursued Greene across North Carolina to the Virginia line, but on March 15 Greene and Cornwallis fought a bloody battle at Guilford Court-house, in which Greene was defeated. Cornwallis, however, leaving his sick and wounded to the care of the Americans, repaired to Wilmington on the seaboard, while Greene, after following him for some distance, marched to South Carolina, and in two campaigns cleared the interior of that state and of Georgia of English troops. Unsuccessful as he was at Guilford Court-house, nevertheless Greene won the southern campaign. Cornwallis from Wilmington marched northward into Virginia, and fortified a strong position on the York River at Yorktown.

Clinton, called back from his southern conquest by the arrival of a French fleet and army at Newport, accomplished little except to hold that army at Newport. In 1781, however, a strong French fleet under Comte de Grasse came north, bringing with him another strong French force. Washington and Rochambeau, the French commander, had agreed to co-operate with De Grasse, and a few days after De Grasse's arrival at the Chesapeake the allied army reached the head of that bay, and before long closely besieged Cornwallis at Yorktown, De Grasse with his fleet preventing reinforcements reaching Cornwallis from New York. He surrendered on October 19, 1781. In England the Whigs again came into power, and in September 1782 the preliminaries of peace were concluded at Paris, although the definitive treaty was not signed until a year later.

The colonists were then living under a constitution known as the Articles of Confederation. The government of this confederation could exert no pressure on individuals; it dealt only with the states, and was at their mercy. This marks the farthest limit of the particularist movement. The old western boundary of the colonies had been the Alleghanies; but the United States by the treaty of 1783 acquired all the land to the Mississippi. Did this land belong to the nation as a whole, or to the states to whom the king might at one time have granted it when they were colonies?

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The whole future of the country rested on the decision of this question. If the management of this splendid domain was undertaken by the United States as a whole, nationality and union were inevitable. The states having claims to these lands gave them to the United States. In 1787 congress passed an ordinance for the government of the territory of the United States north-west of the Ohio. By this it was provided that the settlers of this territory should possess all the rights of the people of the older states, and should have and exercise self-government as soon and to as great an extent as convenience permitted. As soon as any portion of this territory should have a population of sixty thousand it might be admitted to the Union on the same terms as the older thirteen states. These new states were to be admitted as of right to a position of equality with the older states. Thus, for the first time in the world's history, a nation resolved to treat its colonists on equitable terms, giving to them the rights it had claimed for itself. As territory after territory was acquired by the United States the same principles of right were applied, and now the United States comprises forty-four equal co-ordinate states, living peaceably together as one nation.

The Articles of Confederation were inadequate to these new problems. A convention of leading men was held at Philadelphia in 1787, which drew up a constitution. After much opposition it was ratified, and went into force in 1789, and is still the organic law of the United States. The constitution has lived long and worked well because it is based on the experience of the thirteen colonies in self-government, and is elastic enough to be able to adapt itself to changed conditions to almost any extent. It is elastic because the expressions used to define the powers granted by the people to the central government are so vague that their meaning really depends on the decision of the Supreme Court; and experience has shown that that court will ultimately interpret the constitution as the people wish. In addition, the constitution contains a provision for its own amendment; but the process is very cumbersome, and, as a matter of fact, out of over seventeen hundred amendments formally proposed only fifteen have been adopted.

A contest between the large states which wished apportionment based on population and the small states which wished the states to have an equal vote ended in a compromise, by which each state has an equal vote in the Senate, while representation in the House of Representatives is based on population. The House is newly chosen every second year, while only one-third of the Senate is changed each second year. It thus may take six years to change the majority in the latter body. The senators are chosen by the state legislatures, the representatives in districts by the direct vote of those who have the right to vote for the members of the lower house of the state legislature. The House has control of money bills, while the Senate acts in many ways as an advisory council to the president. These arrangements have resulted in the preservation of state lines and local self-government, and also in the representation of wealth and position on the one hand, and of the mass of the people on the other. Furthermore, the House yields readily to the popular will, while the Senate remains firm for a sufficient length of time to allow the people to think the matter over. If the people wish anything for four or six years, the majority of the Senate will change to conform to the will of the majority of the people. The president is elected for an intermediate period of four years. In this way it often happens that the president and one House will be on one side of a question, the other House being on the other. So far all these things have made for stability.

The provision of the constitution which has attracted most attention is that providing for a supreme court, composed of judges who hold office during good behaviour, and whose salaries cannot be diminished while in office. The jurisdiction of this court is almost all appellate. It has almost no dealings with the other branches of the government. If a case involving the constitutionality of a law comes before it, it decides the matter, and if the act is declared to be unconstitutional the federal courts will not enforce it. The Supreme Court can also by writ bring before it any decision of a state court denying the validity of a federal law.

George Washington was unanimously elected first president, with John Adams as vice-president. The American Revolution is ordinarily regarded as ending in 1783. But a far greater revolution than the overturning of the power of England and the substitution of a federative form of government now took place. American society in 1789 was essentially aristocratic, and so were politics. In every state there was a property qualification, and as the right to vote for national officers depended on the right to vote for state officers, it followed that only those possessing property could vote for national officers. And so with everything else, American society and institutions were still essentially English. But the opening up of new countries beyond the Alleghanies, the feeling of independence to which the cutting loose from England gave rise, and, above all, the confidence in the future which the new government inspired, all combined to turn the thoughts of the people toward greater rights for the individual.

This great movement was led by Thomas Jefferson, the Secretary of State, who as far back as 1774 had asserted that governments are founded on truth and justice, and on the rights of men. Jefferson now proposed to give practical effect to these views of the early revolutionary period, and to found, in fact, a government by the people, of the people, and for the people, based on truth, justice, and confidence. At the other extreme was Alexander Hamilton, Secretary of the Treasury, who distrusted men in the mass, looked on them as reasoning not reasonable beings, and wished to found a strong national government to which all of what seemed to him the stronger elements in society should turn. For the time being Hamilton and the Federalists were in the ascendant, Jefferson and the Anti-Federalists being discredited by their opposition to the constitution. There was nothing incompatible between nationalism and democracy. Indeed a strong government based on democracy was and is the only possible government in the United States. But Hamilton was not broad enough to see this, and Jefferson was perforce obliged to use the opposition or particularist party as his ally.

In order to attach the moneyed classes to the national government Hamilton and the Federalists introduced scheme after scheme for the advantage of capital. A protective tariff bound the manufacturers to the central government, while a United States bank bound moneyed interests to it; the funding of the debt and the assumption of the state debts created a large national debt, enriched the speculative classes, and bound the holders of the debt to the central government. For the rest, Hamilton and the Federalists organised the working departments of the government essentially as they exist to-day.

Probably no other man could have given the new government so good a start as Washington. His very presence at its head gave to it a dignity and stability which only years of successful administration could otherwise have secured. Washington

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saw clearly that his most useful work would be to give the country a strong, quiet government, thus gaining time for the constitution to acquire a place in the hearts and traditions of the people. Therefore he endeavoured to keep the country out of all foreign complications, while at the same time he secured the navigation of the Mississippi from Spain, and commercial privileges from England. The French Revolution, however, forced him, as well as other rulers, to take sides.

Like Charles James Fox and other liberal-minded Englishmen, Jefferson sympathised warmly with the ideas and aims of the early leaders of the French Revolution, and underestimated the fickleness and instability of the French people. When the Revolution assumed its propagandist character, and war with England followed, the revolutionists expected to gain sympathy and assistance from the Americans, whom they persisted in regarding as owing France a debt of gratitude for aid in the American Revolution—the fact being that France had then used America as a cat's-paw, and had deserted her at the time of negotiations for peace. The sympathies of the people were with France, but it was a question which divided parties as to how far this feeling should guide the country's policy. Washington decided that the only safe policy for the new nation was one of strict neutrality, and time has justified his conclusion. But Jefferson retired in disgust from the government, and the Federalists soon obtained full control. At the end of his second term Washington declined re-election, and John Adams was chosen president. He inherited not only Washington's policy but his official advisers, who looked to Hamilton, though he was no longer in the cabinet, as the head of the party. Washington's firm hand withdrawn, the country rapidly drifted toward war with France, whose government insulted the Americans by demanding money as the price of peace. A provisional army was set on foot with Washington at its head. But an opening presenting itself, Adams renewed negotiations for peace, and Napoleon, now at the head of the French government, concluded them. This was perhaps the most high-minded and patriotic act of John Adams' whole career; but it lost him the support of his party.

Among the acts of the Federalist majority at this period were the Alien and Sedition Laws, giving the government for a limited period power to deal with foreigners resident in the country, and with those who publicly opposed the acts of the government. It happened that most of the Republican (q.v.) or Jeffersonian journalists were foreigners, and the Republicans, declaring these acts aimed against themselves and their friends, caused the legislatures of Kentucky and Virginia to pass resolutions setting forth the particularist theories as opposed to the nationalist theory of the Federalists. But there the matter rested.

In the election of 1800 the nominees of the Republican party obtained the majority of the electoral vote. Each elector then voted for two persons without specifying which was his choice for president, and Jefferson and Burr had an equal number of votes. No man ever doubted that Jefferson was the person intended to be president. It became the duty of the House of Representatives, in which the Federalists had a majority, to designate which should be president. In their desperation and hatred of Jefferson they determined to elect Burr. In this they failed; but by thus attempting to thwart the will of the people the Federalist party lost the confidence of the people and sank into comparative insignificance. The contest also resulted in an amendment of the constitution, empowering the electors to vote for one man as president and another man as vice-president. Jefferson once in power immediately did away with the ceremonial of official intercourse which had meant so much to Washington and Adams. The one great accomplishment of his two administrations was the purchase of Louisiana, or the western part of the basin of the Mississippi, from France (1803) for about 15 million dollars. This purchase was plainly not authorised by the constitution; and, indeed, for a time Jefferson thought an amendment would be necessary. In 1812 the southern end of this great acquisition was admitted to the Union as the state of Louisiana.

With the renewal of the war between England and France in 1803 came a renewal of the troubles of the United States, now the only neutral nation possessing ships. In the course of time England declared the ports of western Europe blockaded, while Napoleon on his side issued decrees declaring the ports of the Continent closed to English ships and produce, and to ships which had touched at English ports (see CONTINENTAL SYSTEM). To these restrictions Jefferson opposed only counter restrictions, so that the carrying trade was attacked from three directions at once. Portions of the country were ruined, and Jefferson closed his second term, in 1809, amid difficulties of the most serious kind at home and abroad.

James Madison of Virginia, long Jefferson's right-hand man, succeeded him, and was re-elected in 1812. The irritation against the foreigners now increased rather than diminished. With England there was still another cause of dissatisfaction. England claimed and exercised the right to search American vessels for deserters from the English navy and for other British subjects. There were without doubt many deserters, but the right of search was founded on a wrong principle, and besides it was impossible to distinguish between an American and an Englishman. Thousands of Americans were seized and forced to fight for England. Congress was now in the control of a party eager for war with England, and war was begun in 1812. The Americans attempted to invade Canada by the line of Lake Champlain and of the St Lawrence valley, and were driven back. On the water, however, the Americans were almost uniformly successful, the frigates *Constitution*, *President*, and *United States* capturing English vessels of their own class. On the other hand, an English ship, the *Shannon*, captured the American frigate *Chesapeake* off the harbour of Boston. In August 1814 the British captured the city of Washington, burned and destroyed the public buildings there, and attacked the city of Baltimore, but were driven back. In December 1814 this war was concluded by the treaty of Ghent, which was signed twenty-five days before General Jackson repelled a most gallant attack of the British on New Orleans. No mention was made of the right of search, or of impressment in the treaty, but they were given up. On the whole, this 'Second War of Independence' was a good thing for the United States, as it made strongly for nationality, and convinced even the most ardent friend of England of the undesirability of an English connection.

Madison's successor was James Monroe, another Virginian, of moderate abilities, but well fitted to lead the country at a time of complete cessation of party strife, known as the 'era of good feeling.' In 1819 the United States acquired East and West Florida, or all of Spanish America east of the Mississippi, at the same time abandoning whatever claims she had to Texas, California, and New Mexico. Monroe's name is also associated with the formal announcement to foreign powers of the American idea of the separation of American and European politics. This was not a new idea in any

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sense, but the first complete enunciation of it was by Monroe, and it is hence known as the 'Monroe Doctrine' (see MONROE).

With the end of Monroe's administration came an end to the good feeling. The Democratic party became split into factions, each following a leader, John Quincy Adams, Jackson, Clay, or Crawford. No one received a majority of the electoral vote, though Jackson received more than any one else. Nevertheless the friends of Adams and Clay in congress united and elected Adams, who now appointed Clay Secretary of State; and charges of corrupt bargains between 'the Puritan and the Blackleg' were freely made. There is no evidence of corruption, and the House of Representatives had a perfect right to elect Adams; nevertheless he began his term of office under many disadvantages. This was the period of the so-called American system of a high protective tariff, combined with internal improvements, such as the Chesapeake and Ohio Canal, begun at this time. Adams, who was cold and conscientious, refused to use the federal patronage to build up a party devoted to his interests. On the other hand, General Jackson was the idol of a majority of the people. He promised to give a good office to any one who should work for his interests; and in 1828 he was elected president by a vast majority. With the exception of the introduction of the 'spoils system' there is much to be admired in Jackson. He stood for the nation against the state, as in the case of Nullification (q.v.); for the people against the moneyed classes, as in the case of the United States Bank; for the country as against foreign aggression, as in the case of France. During Jackson's time the steam-locomotive was introduced into America, one thousand miles of railroad were built in five years, and American life began to show its tremendous expanding powers.

After Jackson there came a succession of presidents whose names are scarcely worth remembrance. The interest now turns slowly but surely toward the struggle between the North and the South, which led ultimately to war, and to the destruction of the 'Old South.' The sole cause of this divergence was negro slavery, or better perhaps the belief that the cultivation of cotton required unfree black labour. Slavery had existed in all the original thirteen states from the early times. In the North it was not profitable, except in one or two places, and was dying out in 1780. In the South, by which is meant the country south of Mason and Dixon's line, slavery had not been of very much account, except in South Carolina and Georgia, where the malarial rice swamps seemed to require negro labour. The Virginia leaders were against slavery, and expected to see it disappear in the South as it was disappearing in the North. It was unfortunate that the constitutional convention of 1787 did not hold out on these points, and provide for the extinction of slavery whenever the majority of the people of the whole country desired. But what seems plain now was not plain then; slavery was favoured in the constitution, and the slave-owner given more than his proportion of the representation in the House of Representatives. In 1794 Eli Whitney discovered a way by which the cotton fibre and seed could be separated by machinery. This alone made the cultivation of cotton on a large scale profitable, and, combined with great inventions in the art of spinning and weaving in England, enormously stimulated its production, and negro slavery was fastened on the country. As time went on the North became a great manufacturing as well as an agricultural country; cities multiplied, population became denser, and the whole mode of life of pre-revolutionary days underwent a complete and radical change. In the South the old life was in many ways intensified. The two sections thus grew apart.

At first the South, and South Carolina most of all, was very nationalistic. But as time went on and a protective tariff was framed to stimulate manufactures, the South turned completely round. It had no manufactures, and would receive no benefit from this tariff, and many things would be increased in price. It was therefore proposed, somewhat in line with the views of the early Republicans and of the New Englanders during the war of 1812 (see HARTFORD CONVENTION), to declare the disliked law null and void so far as South Carolina was concerned—that is, to nullify it. Jackson, who was then president, met this issue squarely, and an act authorising him to use force was passed. The nullification was suspended, and the whole matter was compromised.

The ordinance of 1787 prohibited slavery in the new territory north of the Ohio, and as states came into existence there this prohibition was carried out, slavery being the custom in the territories and states south of that river. When Louisiana was bought a new element at once came in. Slavery existed in the regions around New Orleans and St Louis. Louisiana and the country around New Orleans was admitted as a slave state in 1812. But when Missouri or the country dependent on St Louis applied for admission, the case was somewhat different. Finally a compromise was made to the effect that Missouri should be a slave state, but the remainder of the Louisiana purchase north of its southern boundary (36° 30′) should be forever free. This was the Missouri Compromise of 1820, and for twenty years it postponed the inevitable conflict.

The United States had acquired by the Louisiana purchase some vague claim to that territory lying between the Sabine, Rio Grande, and Arkansas rivers. This territory, or at all events a portion of it, was known as Texas, and was sparsely settled, mainly by adventurers from the southern states; but slavery was not allowed there by the constitution of Mexico. In 1836 Texas revolted from Mexico, and established a republic. The South cast longing eyes on Texas—the Texans to a great extent were their own folk, and their country would add to the territory suited to slavery. In 1845 Texas was annexed or re-annexed to the United States, and admitted as a state. A dispute with Mexico at once arose as to its western boundary. General Zachary Taylor was ordered to seize the territory in dispute, and war with Mexico followed. In May 1846 he crossed the Rio Grande, and won the battle of Buena Vista. Frémont and others seized and held during the war the country on the Pacific slope now known as the state of California, to which the United States had no claim whatever. In March 1847 General Scott landed on the Mexican coast near Vera Cruz, captured that fortified seaport, and placed his army on the high lands toward the interior. In the autumn he marched towards the city of Mexico, defeating the Mexicans under Santa-Anna in battle after battle, the most important being Cherubusco and Chapultepec, and capturing the city of Mexico. By the treaty of Guadalupe Hidalgo (1848) this war was ended, Mexico ceding to the United States all that the latter had claimed or had seized, comprising the southern and western portion of the state of Texas, New Mexico, the lower part of Arizona, and California. The United States agreed to pay Mexico over fifteen million dollars, and to pay in addition about three million dollars due from Mexico to citizens of the United States. In 1853 this acquisition was rounded out by the 'Gadsden Purchase' of a small strip on the south-western line. The

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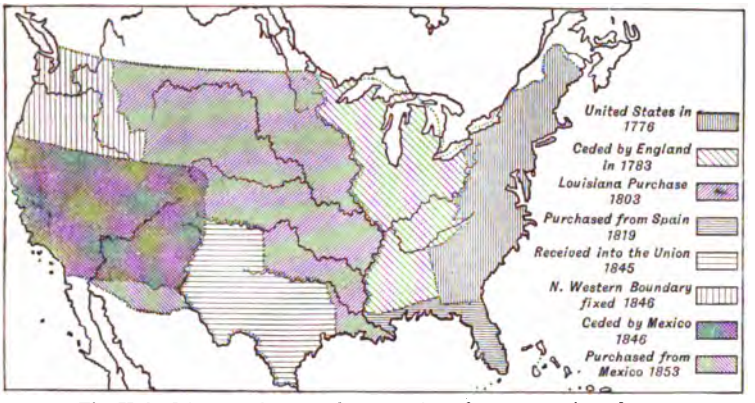
North was in part compensated for this great increase of probable slave territory by the acquisition of that part of Oregon lying south of the 49th parallel, to which the United States had various claims. It was decided to let the people of each portion of the territory acquired from Mexico settle the question of slavery for themselves: this was called 'squatter sovereignty,' though


United States in 1776
Ceded by England in 1783
Louisiana Purchase 1803
Purchased from Spain 1819
Received into the Union 1845
N. Western Boundary fixed 1846
Ceded by Mexico 1846
Purchased from Mexico 1853

The United States, showing the extension of area at various dates.

the phrase may not have come into common use until about 1854. In 1850 California, to which the discovery of gold had attracted a rush of immigrants, was admitted as a non-slave state. To pacify the South, the Fugitive Slave Law (q.v.) was passed, which directed the Federal authorities to return slaves who had escaped to the North. The execution of this act first awakened the people of the North to the gross evils of slavery, and the abolitionists, who had been in existence since 1830, now began to make converts.

In 1854, in defiance of the Missouri Compromise, the principle of 'squatter sovereignty' was applied to the two great territories lying north of 36° and as far as 30°—Kansas and Nebraska. The spirit of the North at last was aroused, anti-slavery men poured into Kansas (q.v.), waged war against the slave party there, and organised the state on a

non-slave basis—though it was not admitted as a state until 1861. This struggle led to the formation of a new party in the North opposed to slavery, with democracy at the bottom and nationalist in spirit. This party adopted as its name that of Jefferson's old party, Republican, and grew with marvellous rapidity. In 1856 a presidential election was held; the Democratic candidate Buchanan was elected by a majority of the electoral vote, but Frémont, the Republican candidate, had a large popular vote. In 1856–57, in his opinion on the Dred Scott Case (q.v.), Chief-justice Taney stated, among other things, that a slave, or the descendant of a slave, could never be a citizen of the United States, and that the Missouri Compromise was unconstitutional. In 1860 the Democratic party was split into two sections, the southern or ultra-slavery Democrats and the northern or conservative Democrats. The southerners demanded the recognition by the party of the duty of congress to protect slavery; the northern Democrats could not possibly agree to this. In the face of a divided party, the Republicans elected their candidate, Abraham Lincoln, president. The North was now much stronger in population and wealth, and growing stronger every day. If the South remained in the Union it would soon be at the mercy of the North. The extreme southern states determined to secede; hoping, no doubt, that the North-west and California would either join them or remain neutral. But the newer states had been largely settled by foreigners, to whom the United States had been a star of hope for many years, until frugality enabled them to emigrate thither. They had no state pride, but were intensely loyal to the country which had received them and given them a chance in life.

The North-west, California, and after a struggle Missouri, Kentucky, and Maryland cast in their lot with the North and East: about eight or nine millions in the South stood against twenty or twenty-two millions in the North, with the resources of wealth and increased production on the side of the latter. The people of the South, however, were bred to command and to the handling of arms. From the first the government of the southern confederacy was despotic in practice. Such resources as it possessed were, therefore, at once used with effectiveness, while the North, unused to arms, and accustomed to do everything by committees or boards, and comparatively ignorant of war, was unable to make good use of its resources for at least two years. At first everything went against the North, and for a while it seemed as if it would be obliged to fight England and the South at the same time. This was due to the seizure and removal from a British vessel of two southern political agents on their way to Europe (see TRENT AFFAIR).

In the beginning the sympathies of France, and still more of England, were on the side of the South. This was due in some measure to political and sentimental reasons, but in the case of England, at least, it was due partly to the cotton famine which followed the closing of the southern ports by the northern naval forces. In January 1863 President Lincoln, by proclamation, declared the slaves in the part of the South then in rebellion free. The character of the struggle was at once changed in the eyes of foreigners, and the sympathy of the outside world turned gradually to the North. Nevertheless the southern agents in England were able to fit out a vessel, the *Alabama* (q.v.), to destroy the northern shipping interests.

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In April 1862 Admiral Farragut captured New Orleans on the Lower Mississippi, and on July 4, 1863, General Grant captured Vicksburg, which commanded the navigation of the middle course of the river. In this way the Confederacy was cut into two parts, and the control of the great stream was in the hands of the North from source to mouth. After the defeat of the Army of the Potomac at Chancellorsville, May 3, 1863, the Confederates attempted for a second time an invasion of the North. The Union army, now commanded by George G. Meade, met them at Gettysburg in south-western Pennsylvania, and on July 1, 2, and 3, 1863, after a most stubborn and bloody conflict, forced them back. Gettysburg and Vicksburg were the turning-points of the war. Soon after Grant was placed in command of all the armies of the United States, and for the remainder of the war operations were conducted on a systematic plan. General Meade retained command of the Army of the Potomac, to Sherman being confided the operations in Tennessee and Alabama. On September 2, 1864, Sherman entered Atlanta, Georgia. Sending a portion of his army back under General Thomas, he marched from Atlanta to Savannah on the Atlantic seaboard, and then turning north carried his army to Goldsboro. Thomas performed his work admirably, destroying the last army of the Confederates in the west at the battle of Nashville in December 1864. Meantime Grant with the Army of the Potomac, under the direct command of Meade, advanced towards Richmond, fighting the terrible battles of the Wilderness, Spottsylvania, and North Anna, and besieged the Confederate army in the lines of Petersburg. The siege lasted through the winter of 1864–65. Grant continued to extend his lines towards the south and west, thus cutting the Confederates off from their source of supplies. On the 2d of April the Confederates broke out through Petersburg, and attempted to escape towards the south and west. By almost superhuman endeavours Sheridan placed his cavalry and an infantry corps across their track, and on April 9, 1865, the Confederate army of North Virginia surrendered at Appomattox Court-house, and about two weeks later the last Confederate army which had been confronting Sherman surrendered. President Lincoln was assassinated during the closing days of the war. The war had cost the nation some $10,000,000,000 and the lives of some 600,000 men, besides perhaps as many more wounded. But it had settled the question whether the United States was a nation or merely an aggregate of nations, and had rescued the South from the incubus of slavery. The seceded states were again taken into the Union, on conditions contained in the 13th, 14th, and 15th amendments to the constitution, abolishing slavery, and giving the negro the right to vote. It cannot be said that these conditions have accomplished their object, as the negro vote is in one way or another completely neutralised, while at the same time the South retains a representation in the House of Representatives based on its total population.

In 1867 the United States purchased Alaska from Russia, the principal result of which up to the present time has been recurring complications with Great Britain as to the right to capture Seals (q.v.). The nation found it difficult to settle down to peace after the war. The army was easily disbanded, although an organisation known as the Grand Army of the Republic was formed, and the 'soldier's vote' is an element with which the politicians annually reckon. Enormous sums of money have been paid for pensions—about 150 million dollars in one year (1891). Another legacy of the war was the tendency towards corruption and the formation of 'rings' throughout the states and cities, as well as in the national government. But slowly these have been found out and dealt with, and a great reform has been made in the civil service towards the overthrow of the spoils system of Jackson. And moreover the greater part of the national debt has been paid off.

The problems to be faced are so different from what they were before the war that it is difficult to foretell what support any particular project will receive. The South now raises more cotton than before the war. At the same time it is rapidly becoming a prosperous manufacturing community, and is no longer opposed to all tariffs as it formerly was. From Lincoln onwards till 1884, the presidents (see list at PRESIDENT) had all been Republicans—Johnson, Grant, Hayes, Garfield, and Arthur. In 1884 the Democratic party, remade and containing many of the young men of the North who had grown up since the war, elected its candidate, Mr Cleveland, over Mr Blaine. In 1888 the Democrats made the campaign on the basis of a reformed tariff, in the direction of less protection. The Republicans won, Mr Harrison becoming president; and by passing what are known as the McKinley Bill and the Administrative Bill reformed the tariff in the direction of greater protection. Trusts and combinations of capitalists have everywhere resulted, while, on the other hand, the relations of 'organised labour' to 'organised capital' have become strained. The growth of corporations has been enormous, and the relations of capitalists to their employees to some extent lack the humane method of the days of individual manufacturers and tradesmen. Many immigrants have brought with them ideas, the result of oppression in the Old World, which are not applicable to the conditions in the New. Many immigrants are undesirable on other accounts, and laws have been passed excluding Chinese labour and rendering difficult the landing of paupers and of aliens under contract. The House also passed a bill to secure fair elections in the southern states—the so-called 'Force Bill.' But the great mass of the people was not in sympathy with these measures, and in 1891 a House overwhelmingly Democratic was elected. In 1892 the contest turned on the same question of tariff as in 1884, and the elections resulted in the return of the Democratic candidate, Mr Cleveland, by a very large majority over Mr Harrison; the representative of the 'People's Party,' General Weaver, having but a small following.

The notices in this work of the various presidents and many of the leading statesmen (Webster, Seward, &c.), soldiers (Gates, Greene, Grant, Sherman, Lee, &c.), sailors (Decatur, Farragut, Porter, &c.; also Ericsson), as well as the several states and the leading cities, may be referred to, and the following articles among others:

Abolitionists.
Agriculture.
Alabama (The).
Alien.
Americanisms.
André.
Apaches.
Arnold, B.
Brown, John.
Bull Run.
Bunker Hill.
Burgoyne.
Canada, p. 695.
Chart.
Civil Service.
Congress.
Cornwallis.
Cotton.
Dairy Farms.
Danites.
Democrats.
Dollar.
Eagle.
Eliot, John.
Emigration.
Fisheries, p. 648.
Flag, p. 665.
Franklin.
Freesoilers.
Frémont.
Fugitive Slave Law.
Garrison, W. L.
General.
Grangers.
Greenbacks.
Immigration.
Independence Day.
Iroquois.
Knights of Labour.
Know Nothings.
Ku-Klux Klan.
Liquor Laws.
Lynch Law.
Modocs.
Molly Maguires.
Mormons.
Mound Builders.
National Debt.
National Hymns.
Naturalisation.
Negroes.
Pensions.
Perfectionists.
Petroleum.
Pisciculture.
Pocahontas.
President.
Prisons, pp. 425–6.
Privateer.
Protection.
Repudiation.
Sioux.
Slavery.
Spiritualism.
State Rights.
Sumter, Fort.
Tammany Society.
Temperance, p. 120.
Tobacco.
Universities.
Vigilance Societies.
Vinland.
Whisky Insurrection.
Women's Rights.
Yankee.

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The best compendious history is Gay's '*Bryant's United States.*' On the earlier period the histories of Bancroft and Hildreth remain the most important connected works. For the later period the works of Henry Adams, McMaster, Schouler, Hildreth, and Von Holst should all be consulted. The historical works of Francis Parkman, Doyle, Frothingham, Brown, and Fiske may also be named; while the accounts in Lecky's *England in the Seventeenth Century* and Mahon's *History of England* are of great value. For the documents, see *Federal and State Constitution, Colonial Charters and other Organic Laws*, and *Treaties and Conventions between the United States and other Powers*, issued by the United States government. The leading works on the constitution are those of Story, Kent, Wharton, Curtis, Cooley, De Tocqueville, and Bryce. For the innumerable special works, biographies, and bibliographical details, see Winsor's *Narrative and Critical History of America.*

AMERICAN LITERATURE.

The differentiation of literature proper from the writings of the learned professions was proceeding in England during the colonial period of America, and, of course, with much more rapidity than in the colonies. In the absence of great centres of population, and of leisure for the cultivation of the æsthetic arts, the colonist was as dependent upon the mother-country in letters as in politics. And although from the time of the Stuart restoration there are indications of a divergence in social and political temper, which in the long run must find expression in a distinct American literature, yet the literary emancipation of America was effected much more slowly than the political.

I. Before the middle of the 18th century there was in the colonies no literature worthy of the name. Massachusetts and Connecticut had some vigour of intellectual movement, which was controlled by men who had enjoyed the academic advantages of the English universities, or of the substitutes for these they had established in America in Harvard (1638) and Yale (1700) colleges. But it is rare that moral and spiritual earnestness have the wisdom to enlist beauty of form in their service. These good men had no perception of intimate relations between goodness and beauty. This is especially evident when they attempt verse. Their *Bay State Psalm-book* (1640; rev. ed. 1650) takes rank among the worst and most tasteless books of a class which abounds in such. Mrs Anne Bradstreet (1612–72) was greeted as 'the tenth Muse,' in recognition of verses which exhibit some of the faults but none of the excellences of the fanciful school of Donne and Cowley.

The influence of the new English prose of Steele and Addison made itself felt slowly. It did very little for the style of Jonathan Edwards (1703–58), who was notable as a naturalist, metaphysician, and divine. Much better in point of literary form, although with just as little purpose of achieving it, is the Quaker John Woolman (1720–73), whose *Journal* (1774; ed. by Whittier, 1871) delighted Lamb and Edward Irving. A better representative of the prevalent temper of the colonies, and more ambitious of literary distinction, is Benjamin Franklin (1706–90). In him the thrift and shrewdness of that later day displaces the Puritan enthusiasm; and we learn from his *Autobiography* (1817; ed. by Bigelow, 1868) that he formed his style on the accepted models of the new English prose.

II. From the rise of Franklin into influence until the close of the second war with Great Britain Philadelphia was the intellectual and literary centre of the country, as it was the largest and most thriving centre of population. The pseudo-classic school dominated American taste, and Pope was reckoned the greatest of poets. The ambition of the most patriotic American writer was to rival the authors of the mother-country in the forms then accepted by both; and America lingered far behind in the movement for the introduction of more delicate and melodious cadences of verse.

The struggle for independence was the occasion of some strong and able writing on political topics, but of nothing whose literary quality entitles it to a place beside the speeches of Chatham and the pamphlets of Burke. Thomas Paine (1737–1809) showed himself a master of popular English to an extent which gives him rank close to Defoe and Cobbett. His style has vitality, and has done much to keep his writings on politics and religion from oblivion, in spite of their shallowness and frequent coarseness. The war did not produce a single respectable song. Philip Freneau (1752–1832) is the only patriotic lyrist worthy of mention; but his fluency and his occasional felicities have not secured him any continuous popularity. Francis Hopkinson (1737–91) wrote 'The Battle of the Kegs,' and other clever satirical skits; and his son, Judge Joseph Hopkinson (1770–1842), wrote in 1798 the first national song, 'Hail Columbia!' John Trumbull (1750–1831) applied the metre and manner of *Hudibras* to the chastisement of the Tories in his *M'Fingall* (1782), and won great popularity. The struggle over the adoption of the national Constitution in 1787–89 brought into play more ability in political writing than did the war. The first political classic of America, *The Federalist*, is a series of papers in which Hamilton, Madison, and Jay advocated and explained the new scheme of government. To Hamilton also is ascribed President Washington's 'Farewell Address' (1796), another political classic.

Philadelphia for a time was the seat of the new government. She had the most enterprising publishers, the best periodicals, the widest circle of readers; and her people loved to speak of her as the 'Athens of America.' Authors from other parts of the country made her their home, or sent their books to her publishers, and their contributions to her magazines. Dr Benjamin Rush (1745–1813) may be said to have continued the Franklin tradition in the same practical and tolerant spirit, and with the same regard for public utility, but with far less literary faculty. The first professional man of letters, Charles Brockden Brown (1771–1810), wrote a series of novels—*Wieland* (1798), *Ormond* (1799), *Arthur Mervyn* (1799–1800), and *Edgar Huntley* (1801)—which were republished in England, and are known to have exerted a great influence over Shelley. They belong to the dominant school of 'Monk' Lewis and Mrs Radcliffe, but are sufficiently individualised by their clear, nervous style, rising at times to eloquence, and by their power of imaginative portraiture, to claim recognition. That they were written with great rapidity explains their lack of symmetry and their defective method.

Outside of Philadelphia New England was most productive. She gave that city Joseph Dennie, editor of the *Portfolio*, the most important literary periodical of the time. It was in Dennie's group that Tom Moore found a congenial welcome. Dr Timothy Dwight of Yale College wrote forgotten epics, and the hymn, 'I love Thy kingdom, Lord.' Joel Barlow (1775–1812), also of Connecticut, is not remembered through either his epic of 7000 lines, *The Colombiad* (1808), or his humorous poem on 'Hasty Pudding.' Thomas Green Fessenden of New Hampshire (1771–1837), in his humorous idyll, 'The Country Lovers,' struck a note which may have suggested Lowell's verses, 'The Courtship.'

III. About the year 1816 pre-eminence in literature began to pass from Philadelphia to New York, just about the time when the completion of the Erie Canal put that city in the way of benefiting by the growth of the west. But the cause of the transfer is found in the superior susceptibility of a

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group of New York authors to the new literary influences represented by Wordsworth, Byron, and Scott, which the critics of the rival city treated with contempt.

Washington Irving (1783–1859) had already written *Knickerbocker's New York* (1809), the most American of his books, and the first classic piece of American humour. His residence in England in 1815–32 brought him into contact with the Romantic movement in literature. In *The Sketch Book* (1819), *Bracebridge Hall* (1822), and *Tales of a Traveller* (1824), he showed the new influence; and he transplanted this Romantic tendency to the New World in his tales of colonial life on the Hudson. A subsequent residence in Spain awoke his interest in the popular traditions of that country, and its history during its period of American discovery. But history and biography were not his proper work, and only his *Life of Goldsmith* (1849) can be called successful, while his elaborate *Life of Washington* (1855–59) never won a place for itself. His works widened the horizon of American literature, and raised the conception of literary form and method, but they had not the vigour required to give it permanent direction. They still delight those who appreciate the quiet beauty of their style, the lambent Addisonian humour, and their genial spirit; but they lack robustness and sympathy with the age.

No want of the American quality can be charged upon James Fenimore Cooper (1789–1851), although he also received the literary impulse from Scott. His novels, *The Spy* (1821), *The Pioneer* (1823), and *The Last of the Mohicans* (1826), laid the foundation of a new literature by showing the imaginative interest which attaches to the pioneer life and to the Indian character; and his naval tales, beginning with *The Pilot* (1823), made an impression equally vivid. He wrote too much, however, to write well, and to avoid repeating himself; and he unduly idealised both the sailor and the red man. Among his contemporary imitators are James Kirke Paulding (1779–1860), in the mass of whose satirical and whimsical works are found *The Dutchman's Fireside* (1831) and *Westward Ho!* (1832); John Pendleton Kennedy of Baltimore (1795–1870), whose *Swallow Barn* (1832), *Horse-shoe Robinson* (1835), and *Rob of the Bowl* (1838) show him a student also of Irving's humour, thus supplying an element lacking in Cooper himself; and William Gilmore Simms (1806–70), a South Carolina planter, who cultivated literature in an uncongenial atmosphere, with fair success.

William Cullen Bryant (1794–1878), before he made New York his home in 1825 had already done much of his best work as a poet, and had illustrated his passage from the school of Pope to that of Wordsworth. He has the English poet's contemplative sympathy with the greatness and the calm of nature; but his first-hand intimacy with her subtlest moods, his almost uniform loftiness of imagination, and his severe self-restraint forbid us to class the author of 'Thanatopsis' and 'To a Water-fowl' as any man's disciple merely. He lacked only warmth of passion and continuous growth to become the greatest of American poets, and the last he missed by making poetry only one avocation of a busy life. Less of a voice and more of an echo is Fitz-Greene Halleck (1790–1867), who imitated Byron's lighter manner in *Fanny* (1821), and reminds us of Scott's best verse in *Marco Bozzaris* (1827). Joseph Rodman Drake (1795–1820) transferred fairyland to the banks of the Hudson in his *Culprit Fay* (1816), and justified Halleck's fine dirge over his untimely death.

Contemporary are two groups of hymn-writers. Of those who contributed to Dr Nettleton's *Village Hymn-book* (1824) Mrs Lydia Huntley Sigourney (1791–1865) was a facile writer, recalling Mrs Hemans, and like her possessed of a thin vein of true poetry. To the prayer-book collection of the Protestant Episcopal Church (1826) Bishops George Washington Doane and Henry Ustick Onderdonk, Dr William Augustus Muhlenberg, and Francis Scott Key furnished original hymns of merit. The last had already (1814) written 'The Star-spangled Banner,' the florid national anthem of America.

IV. A new period begins about 1838, with the transfer of literary pre-eminence to New England, and especially to Boston, and lasts until the war for the Union. America now came into contact with other literatures than that of England, and the broader culture thus attained was accompanied with a more vigorous independence. A literary class arose, so that letters no longer were the ornament of a learned profession or secondary work of an editor. The first impulse to better things came from the study of Coleridge, which led on to that of the poets, critics, and philosophers of Germany, and thus put an end to the dominance of the sensualistic 'common-sense' philosophy of Locke. Dr James Marsh of Middlebury, Dr Channing, and Emerson were the first to show this new influence.

Like Channing, Ralph Waldo Emerson (1803–82) is more important as a personal influence and inspiration than as a man of letters. His doctrine of the sovereignty of the individual conscience met the needs of a time of general revolt against the social and intellectual traditions. He denied the validity of any lines the conscience did not draw for itself; and, although he combined with this the recognition of an Over-soul, this phase of his teaching made less impression, as the Over-soul is an impersonal something, which is at once identical with and different from the individual. After the appearance of *Nature* (1836) and his *Essays* (1841–44) his home at Concord was the centre to which pilgrims came to find his secret of lofty serenity in full view of the puzzles of the universe. His prose is vastly more important than his verse, which is uneven and often faulty in structure, but with many fine lines and felicitous phrases. His prose has been called a 'difficult staccato;' the sentences do not fuse into paragraphs, but read as if there were at the end of each a pause for a reply. Under his audacities lies the shrewdness of New England, and the homely mother-wit of his own people.

The group around Emerson, called the Transcendentalists, were of various magnitudes and qualities. Henry David Thoreau (1817–62) found in intimacy with nature an escape from the pettinesses of men; Amos Bronson Alcott (1797–1888) undertook the reform of education on the principle that all important truth was to be found in the intuitions of children; Margaret Fuller-Ossoli (1810–50), the 'Zenobia' of Hawthorne, made most impression by her conversational faculty; Jones Very (1813–80) wrote poetry 'by inspiration' during the years 1838–39. His poems, which Emerson edited, are narrow in range, but have a delicate wild-flower beauty of their own. These and others contributed to *The Dial* (1840–43), and most of the group took part in the famous Brook Farm (q.v.) experiment in communism.

On the outskirts of the group, as an interested and curious spectator, stood Nathaniel Hawthorne (1804–64), a religious and social conservative, with a passion for the study of the abnormal, which we may trace to his early environment at Salem, where one of his ancestors had been judge in witchcraft time. His works give us life as seen in 'the moonlight of romance,' and stand in curious contrast to his own life as office-holder and man of affairs in a world he really held at arm's length while attending to its routine. His *Twice-told*

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Tales (1837–42) already surpassed all previous American writing in the field of prose fiction; and *The Scarlet Letter* (1850) secured his position as the greatest of American prose writers. His art is thoroughly idealist—character, incident, and situation being subordinate to the haunting idea of the story he is telling. His style is one of exquisite purity, delicate humour, and a genuine pathos.

Hawthorne stands almost alone as a great master of fiction at this time. Miss Susan Warner (1819–85) wrote tales which gave pleasant glimpses of life in central New York, but overburdened them with didactic elements. Mr Edmund Quincy (b. 1808) in *Wensley, a Story without a Moral*, (1854), gave a promise which was not kept. The Rev. Sylvester Judd (1813–53) made a display of ill-regulated power in *Margaret* (1845), which explains Lowell's encomium of the book and the public neglect. The Rev. Robert T. S. Lowell (1816–91) in *The New Priest in Conception Bay* (1858) shows a command of both pathos and humour, but the polemic purpose detracts from the general interest. This is not true of a still more polemic novel, *Uncle Tom's Cabin* (1852), by Harriet Beecher Stowe (b. 1812), which struck at slavery at its most vulnerable point, and rendered the greatest service that a single book ever did to any great cause. But as works of art *The Minister's Wooing* (1859) and *Oldtown Folks* (1869), two of her stories of New England, are superior. George William Curtis (1824–92) shows keen satiric power in *The Potiphar Papers* (1854), and equal beauty of fancy in *Prue and I* (1856).

Of the poets of this period Henry Wadsworth Longfellow (1807–82) filled the largest space in contemporary attention, and thus rendered the greatest service to his countrymen in awakening the love of beauty, and extending the taste for pure art to a wider circle than was reached by any other American. He is the first and chief representative in American verse of that great Romantic movement which Irving in a different way reflects in his prose. As such he was drawn to the past and the distant for his favourite themes, and echoes but faintly the life of the present. *The Golden Legend* (1851), a study of mediæval life, is his most perfect poem; and his version of Dante's *Divine Comedy* (1867) is that to which he gave longest and most loving labour. His *Poets and Poetry of Europe* (1845) amplified the resources of American thought and taste, while exhibiting his own cosmopolitanism. It is not surprising to find that in *Kavanagh* (1849) he belittles the idea of a national literature, preferring Goethe's conception of a world-literature. Even in handling American subjects he turns to Europe for metrical forms and for illustrations. But his artistic grace, and an undefinable winningness in his verse as in his temper, made his countrymen uncritical of any defects.

A greater poetic force and a wider range of movement is seen in James Russell Lowell (1819–91). A scholar of wide learning, and a luminous critic of other men's work, he yet was free from the bookish tone of Longfellow. He wrote of man and of nature at first-hand. His poetry reflects the deepest life of his time, especially of the great struggle with slavery; and it covers the widest range of tone, from the pure æstheticism of his first work to the intensity of 'The Present Crisis' (1845) and the 'Harvard Ode' (1865), and again to the racy fun of *The Biglow Papers* (1848 and 1867). These last mark the highest point reached by American humour, and they also open the series of dialect-writing.

With more monotony, but inferior to none in poetic passion and affluence of imagination, John Greenleaf Whittier (1807–92) takes his place as a lyric and idyllic poet. Burns's poems early gave direction to his genius, and helped him to become the poet-laureate of abolitionism, so that much of his verse is its battle-cry. But like Burns he was at his best in the idyll, and his *Snow-Bound* (1866), although pitched in a key somewhat too high, is full of true and tender beauty.

Oliver Wendell Holmes (b. 1809), the last survivor of the group, made his reputation as the wittiest and one of the most polished of American poets, and then, in his forty-eighth year, entered upon a new field of prose writing in his *Autocrat of the Breakfast-table* (1858), with a success which all but eclipsed his poetry. In both he displays those lasting excellences of 18th-century writing which have won admirers and imitators among younger American writers and critics. His verse is characterised by epigram and sparkle, but seldom rises to passion.

Lesser poets of New England are Dr Thomas Williams Parsons (1810–92), whom the study and translating of Dante led into the Roman Catholic Church, and whose lyric gift was of the rarest; the Rev. Charles Timothy Brooks (1813–83), who laboured chiefly in translation from the German; Julia Ward Howe (b. 1819), an ornate and impassioned lyrist; Richard Henry Dana (1787–1879), a gifted nature, whose delicate reserve prevented his making the impression he might.

Notable poets were not confined to New England. Edgar Allan Poe (1809–49) represented in his verse, and maintained in his critical writing, the principle, then a novelty, of 'Art for Art's sake,' against the didacticism of his contemporaries. From Coleridge and Shelley he had learned the possibilities of melodious cadence, and put the lesson to use in verse that is perfect in its rhythmic flow. His weird tales, in which a powerful imagination and a fine artistic sense deal with motives of horror and melancholy, have exerted a wide influence in European literature (Baudelaire).

Yet Walt Whitman (1819–92) has attracted nearly as much attention in Europe for the opposite reasons. In his *Leaves of Grass* (1855) he carried Emerson's sovereignty of the individual into art and morals, casting aside the restraints of rhyme and rhythm as 'feudal,' and glorifying mere animalism. It is natural for those who think democracy a milder form of anarchism to recognise in his work the peculiarly American form of verse. In single lines, and in a few whole poems, he shows that he had a poetic gift which might have got him a lasting recognition if it had been put to wiser use.

Bayard Taylor (1825–78) is best known as a writer of travels, but he carried with him the poet's eye. His greatest work is his scholarly rendering of Goethe's *Faust* in the metres of the original (1870–71). Other notable translators are F. H. Hedge, *The Prose Writers of Germany* (1847); William H. Furness, *Schiller's Song of the Bell* (1849); and Charles G. Leland, *Pictures of Travel* (1855), *The Book of Songs* (1863), and other works of Heine. Mr Leland is a literary virtuoso, finding delight in all the byways of letters—Pidgin-English, Hans Breitmann's Teutonic English, the Gypsies, &c.

Theology in the hands of its best writers resumed something of its earlier relations to literature. William Ellery Channing (1780–1842) carried the gentle spirit of a Protestant Fénelon into the polemic time of the severance of Unitarian from Orthodox, and taught men that 'God is Love.' Theodore Parker (1810–60) applied hard-headed logic and resonant rhetoric to the compromises of both church and state, sharing with Channing in the honours of the anti-slavery struggle. Horace Bushnell (1802–76), 'the Tennyson among the theologians,' laboured as a devout and original thinker to bring the Puritan divinity into harmony

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with the humaner thought of our age; a mission undertaken in a different way and with less depth of insight by Henry Ward Beecher (1813–87) as a popular preacher and essayist.

Political eloquence as early as Fisher Ames (1759–1808) sought to win by beauty of form. That of Henry Clay (1777–1852), Daniel Webster (1782–1852), and John C. Calhoun (1782–1850) belongs to an era before that which we are considering. But the succession of political orators was ably sustained by Charles Sumner (1811–74), Wendell Phillips (1811–84), Anson Burlingame (1820–70), Edward Everett (1794–1865), Robert Toombs (1810–85), and Alexander H. Stephens (1812–83). It used to be said that 'eloquence was dog-cheap with the Abolitionists,' and it also might be said of poetry. But the movement has not left much prose of lasting merit. Channing, Emerson, Parker, Beecher, Phillips, and Garrison were its best-known writers. Mrs Lydia Maria Child (1802–80) sacrificed her literary career by her *Appeal in Behalf of that Class of Americans called Africans* (1833).

Thanks to the influence first of Coleridge and then of the Germans, literary criticism entered upon a new phase, learning to contemplate every work of art as an organic whole and in the light of its leading idea. Poe and Margaret Fuller did excellent work in exposing the weakness of mere literary pretenders, and even the faults of the strong. Henry Reed (1808–54), the friend and editor of Wordsworth, studied Shakespeare and other English poets. Henry Norman Hudson (1814–86) worthily opens the series of American Shakespearian specialists. Francis J. Child (b. 1825) edited the Boston collection of the British poets, and, in the *English and Scottish Ballads* (1857–59) with which it opens, laid the foundation of his fame as the chief master of that subject.

In history the achievements of the period have great merit. The spirit of research in both American and related fields was stimulated by contact with German scholarship. With George Bancroft (1800–91) American history puts on a thoroughness and a dignity worthy of the subject; but his *History of the United States of America from the Discovery of the Continent* (1834–82; revised ed. 1883–84) is florid in style, and not always free from prejudice. Richard Hildreth (1807–65), in contrast to Bancroft's optimism, writes the *History of the United States* (1849–52; revised ed. 1854–55) in a tone of severe criticism, and with leaning toward the Federalists. John Gorham Palfrey (1796–1881) has written a *History of New England* (1858–90) of solid but not brilliant merits. Charles Wentworth Upham has made a special study of *Salem Witchcraft* (1831; enlarged ed. 1867), which is exhaustive if not judicial. William Hickling Prescott (1796–1859), following the example of Irving, devoted himself to the Spanish side of American history, and that of Spain in the period when her relations with the American continent were most intimate, beginning with *Ferdinand and Isabella* (1837). He has a clear, graphic style, and is master of the art of lively and picturesque narrative; but, in spite of his scrupulousness in research, later scholarship has called in question many of his conclusions. His friend and biographer, George Ticknor (1791–1871), was past the prime of a life of scholarly research when he published his *History of Spanish Literature* (1849), which European scholarship recognises as the best. John Lothrop Motley (1814–77) took as his theme the heroic age of the Dutch nation, throwing himself into the struggle with Spain so fervently as at times to obscure his judgment; but the vigour this imparts to his histories makes up somewhat for lack of simplicity. Francis Parkman (b. 1823) published two works in this period.

In biography America abounds, but the art of writing a good book of this class seems to be the last her authors have acquired. Mr Ticknor's *Life of Prescott* (1864) and Mrs L. M. Child's *Isaac T. Hopper, a True Life* (1853), seem to deserve mention for their literary quality. The *Memoirs of Margaret Fuller-Ossoli* (1852), are disappointing, although in part by Emerson, J. F. Clarke, and W. H. Channing, and have been superseded by Colonel T. W. Higginson's briefer work. The *Autobiography of Peter Cartwright* (1856), a frontier circuit-preacher, was a favourite with Mr Lowell.

In the literature of travel Richard H. Dana, junior (1815–82), takes the first place with his *Two Years before the Mast* (1840). Longfellow's *Outre Mer* (1835), Emerson's *English Traits* (1856), Bryant's *Letters of a Traveller* (1859–60), and Mrs Stowe's *Sunny Memories of Foreign Lands* (1854) are not the best work of these authors. George William Curtis (1824–92) in his books on Egypt and Syria (1851–52) gives us travel pictures full of feeling and fancy. Frederick Law Olmsted (b. 1821) writes with genuine charm in his *Walks and Talks of an American Farmer in England;* and his books describing his tour through the southern states on the eve of the war are of permanent value as by 'a credible person with eyes.' J. Lloyd Stephens' *Travels in Yucatan* (1849), Elisha Kent Kane's *Arctic Explorations* (1854–56), Dr Edward Robinson's *Biblical Researches in Palestine* (1841–56) are valuable for their contents rather than their literary art. The last opened a new era in its department. George Stillman Hillard (1808–79) is the author of a fresh and readable book on a much bewritten country, *Six Months in Italy* (1853); and beside it may be placed H. T. Tuckerman's *Sicily* (1852). Hawthorne's writings of this kind belong to the next period. But the most prolific and in many respects the best traveller is Bayard Taylor, whose first work was *Views Afoot* (1846).

V. The year 1860 is a dividing line in the history of American literature, as of politics. The great social convulsion it ushered in had a powerful effect on the intellectual development of the country; and the intense sense of nationality then awakened has been reflected more adequately in literature than in any other form of art. On the other hand, the war showed the Americans the variety as well as the magnitude of their country, and thus awakened an interest in local peculiarities of character and speech which are seen to give colour and flavour. At the same time it destroyed the pre-eminence of the former literary centres by arousing in new communities the ambition to excel in literature as in other forms of art. Although many of the great writers of the Boston circle lived on and wrote, they opened no new vein; and the younger attained no marked superiority over their rivals elsewhere. New York, by virtue of its advantages as a distributing centre, has attracted men of letters to residence, but has not created any distinct public interested in their presence.

The new scientific spirit, which dates from the appearance of Charles Darwin's *Origin of Species* (1859), has affected literature in many ways, but especially in teaching to view life as a whole and in its complexity, and in showing that every object of study represents a stage in a development and must be understood in the light of its past. Along with this there has been an increased love of prose fiction—the form of imaginative art that most easily complies with these scientific demands.

In poetry there is no name of the new age that can be put beside the group which begins with Bryant and ends with Holmes. Yet every part of the national area has made an important contribution. The north Atlantic states, the first home of American culture, keep the lead with

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Henry Howard Brownell (1820–72), George H. Boker (1823–90), Richard Henry Stoddard (b. 1825), John T. Trowbridge (b. 1827), Edmund Clarence Stedman (b. 1833), Thomas Bailey Aldrich (b. 1836), John White Chadwick (b. 1840), Edmund Rowland Sill (1843–87), Samuel Willoughby Duffield (1843–87), John Boyle O'Reilly (1844–90), Richard Watson Gilder (b. 1844), George Parsons Lathrop (b. 1851), Henry Cuyler Bunner (b. 1855), Richard Burton (b. 1859), Frank Dempster Sherman (b. 1860), Clinton Scollard (b. 1860), and Charles Henry Lüders (1869–91). The south offers Theodore O'Hara (1820–67), Henry Timrod (1829–67), Father Abram J. Ryan (1839–86), Paul H. Hayne (1840-87), Sidney Lanier (1842–81), and A. C. Gordon (b. 1855). In the inland states we find John James Piatt (b. 1835) and his gifted wife, John Hay (b. 1838), Bishop John L. Spalding of Peoria ('Henry Hamilton,' b. 1840), James Maurice Thompson (b. 1844), William Carleton (b. 1845), Eugene Field (b. 1850), and James Whitcombe Riley (b. 1854). The Pacific coast is represented by Francis Bret Harte (b. 1837), Joaquin Miller (b. 1841), and John Vance Cheney (b. 1848).

It is noteworthy that the better education of women begins to furnish its results in the increase of writers of that sex. As poets they take almost an equal rank with their brethren singers. Phœbe Cary (1824–71) and her sister Alice Cary (1820–71), Adeline D. T. Whitney (b. 1824), Margaret Junkin Preston (b. 1825), Lucy Larcom (b. 1826), Rose Terry Cooke (1827–92), Helen Hunt Jackson (1831–85), Harriet Elizabeth (Prescott) Spofford (b. 1835), Mary Emily Bradley (b. 1835), Celia Thaxter (b. 1836), Edna Dean Proctor (b. 1838), Sarah Chauncey Woolsey ('Susan Coolidge,' b. 1845), the Jewess Emma Lazarus (1849–88), Edith Matilda Thomas (b. 1854), Louise Imogen Guiney (b. 1861), and the Goodale sisters, who wrote good verse in their teens, constitute a group of genuine achievement and lofty promise.

The new poetry has less of the passion of humanity than that which preceded, the tension of the war having been followed by a reaction. It studies nature more closely, and almost with the naturalist's eye. It exhibits superior technical finish. It generally contemplates the problems of existence in a less hopeful spirit, and with a new sense of their complexity. To designate the ablest is not an easy task, but Lanier, Riley, and Sill, Miss Larcom, and Mrs Jackson certainly are not the rearmost. Mr Lanier aimed at musical effects in verse to which he did not entirely attain. Mrs Jackson loves riddles, but they are worth the solving. Mr Sill inspires regret that his rare genius closed its career just as its best became possible. Miss Larcom, who began her career in the measuring-room of a Lowell factory, shows the influence of her friend Whittier on an original imagination. Mr Riley touches the popular heart by the humanity of his varied verse.

In America, as elsewhere, prose fiction has wrested from poetry the place of pre-eminence, and by its popularity has enlisted the pens of many who are better fitted for other work. The first American novelists are William Dean Howells (b. 1837), Francis Marion Crawford (b. 1845), Frances Hodgson Burnett (b. 1849), Henry James (b. 1843), George W. Cable (b. 1844), F. Bret Harte (b. 1839), Mary Noailles Murfree ('Charles Egbert Craddock,' b. 1850), Frank Stockton (b. 1834), and Louisa May Alcott (1832–88). Mr Howells has portrayed American life with a fidelity to both its brighter and its duller sides which has led others as well as himself to class him with the Realists; but he never gives us photography in the place of art. In brief, half-dramatic sketches he is incomparable. Mr Crawford shows a much greater range, grasping with a firm hand the most varied forms of old-world life, making both situation and character vivid in interest, but avoiding American subjects. Mr James, like Mr Howells, sometimes writes of 'those who delight to dwell in Boston,' but hardly in an American spirit. His strength is in psychological analysis. Mrs Burnett, an American by adoption, writes with equal power and pathos of life on both sides of the ocean, and passes with firm step from the political coteries of the capital to the mountaineers of North Carolina. Mr Cable and Miss Murfree discovered to literature the picturesque life of the Louisiana creole and the east Tennessee mountaineer. Mr Stockton carries American humour into story-telling with distinguished success. Miss Alcott lifted the art of writing stories for the young to a higher level.

The tendencies thus illustrated run through American fiction. From the life of the city to that of the frontier, from the brightest fun to the gravest humour, from philosophic analysis to story-telling for childhood, it covers the whole life of the nation. New England in stories of local colour still holds the first place, especially through the short tale created by the demand of the magazine, and endowed with a larger choice of motives than is the elaborate novel of love and marriage. Rose Terry Cooke (1827–92). Annie Trumbull Slosson (b. 1838), Elizabeth Stuart Phelps-Ward (b. 1844), Sarah Orne Jewett (b. 1849), and Mary E. Wilkins are of this class. The cities other than Boston fare worse, although New York has Richard Burleigh Kimball (b. 1816), Henry Cuyler Bunner (b. 1855), Henry Harland ('Sidney Luska,' b. 1861), and Constance Cary Harrison (b. 1835). The south offers us Thomas Nelson Page (b. 1853) and Joel Chandler Harris ('Uncle Remus,' b. 1848); and the interior, Edward Eggleston (b. 1837), Mary Hallock Foote (b. 1847), and Edward W. Howe (b. 1834), who draws with hard and faithful lines the harsh life of the prairie town. In the group headed by Miss Alcott, the writers for the young, Adeline D. T. Whitney (b. 1824), Rebecca Sophia Clarke ('Sophie May,' b. 1833), Sara Jane Lippincott ('Grace Greenwood,' b. 1823), Sarah Chauncey Woolsey ('Susan Coolidge,' b. 1845), Mary Mapes Dodge (b. 1840), Louisa Chandler Moulton (b. 1835), and George Cary Eggleston (b. 1837) are noteworthy.

Humour is an element almost universal in American fiction, but its especial representatives are Charles Dudley Warner (b. 1829), Charles Farrar Browne ('Artemus Ward,' 1833–67), Samuel C. Clemens ('Mark Twain,' b. 1835), Mary A. Dodge ('Gail Hamilton,' b. 1838), and Robert J. Burdette (b. 1844). Edward Everett Hale (b. 1822) shows equal power to provoke tears in 'The Man without a Country' and laughter in 'My Double and How He Undid Me.'

History and biography have profited through the popularity of the evolution theory, the growing interest in sociological problems, the patriotic impulses stirred by the war, and the diffusion of the literary culture which fits to undertake a work of this class. In many cases contact with German methods has been helpful. Of the picturesque school, Motley and Parkman continued to write after 1860, the latter doing most of his best work since that date. His books on the struggle between France and England for the New World, by their vividness of description, their grasp of the leading issues at stake, and their soundness of judgment, have put him at the head of American historians. Writing on the period of the independence of the republic, James Schouler and Henry Adams fix attention most upon government and politics, while John Bach Macmaster gives much space to social life and usages, showing how picturesque and interesting literary art may

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make the everyday annals of a democratic people. The *Narrative and Critical History of America*, in eight large volumes (1886–89), edited by Justin Winsor (b. 1831), covers the whole continent. Like the *Memorial History of Boston* (1880–82), edited by the same writer, it aims at expert discussion of each branch and phase of its subject, and dispenses with literary unity. John Fiske's *Critical Period of American History, 1783–89* (1888), and his *Discovery of America* (1892) exhibit scientific thoroughness and clearness. Local history, especially that of New England and of the separate commonwealths of the Union, has come to be a branch of literature; and various series of biographies of statesmen, men of letters, religious leaders, &c., have shown that this difficult branch of literary art is at last naturalised in America.

The war for the Union naturally produced a deluge of books of very various degrees of merit. The first place may be assigned to the *Personal Memoirs of Ulysses S. Grant* (1885), in which the great captain narrates with modesty and candour the events in which he played so notable a part. The memoirs of Generals Lee and Sherman, the monumental biography of President Lincoln by his secretaries, the Life of William Lloyd Garrison by his sons, and James Gillespie Blaine's *Twenty Years of Congress* are of prime importance to the student of the time; and beside them stand the formal histories of the war by Henry Wilson, John W. Draper, Horace Greeley, and the Comte de Paris.

In fields outside their own country Americans have done little in history. John Foster Kirk's *Charles the Bold* (1864–68), Eugene Schuyler's (1840–90) *Peter the Great* (1884), Henry Charles Lea's *Sacerdotal Celibacy* (1867; rev. ed. 1884) and *Inquisition of the Middle Ages* (1887), Herbert Tuttle's *History of Prussia* (1884–88), John C. Ropes's eulogistic biography of the first Napoleon (1885), Harold Frederick's *Reconstruction of Europe, 1850–70* (1889), and James K. Hosmer's biography of the younger Vane (1888) are among the exceptions. The number of translations and reprints shows that this indifference is only apparent.

In church history, besides the voluminous work of Philip Schaff, we have two well-written handbooks by George Parke Fisher and William M. Blackburn. American church history is greatly neglected, there being no general work that has either historic worth or literary merit, and hardly a readable denominational history. That of the Protestant Episcopal Church, by S. D. McConnell, is an exception. The best work in this field is biographical, and even here the application of literary method is exceptional.

In the literature of travel America wins most honour from the work of her adopted citizens, Henry Morton Stanley (b. 1840) and Paul Belloni Du Chaillu (b. 1835). Lowell, Howells, Lathrop, Mrs Jackson, Hawthorne and his wife, James, Aldrich, Hale, Miss Procter, Story, Warner, Clemens, Hay have all been contributors to this branch. American travel turns with most affection to England —James Mason Hoppin, *Old England* (1867); Richard Grant White, *England Without and Within* (1881); William Winter, *Shakespeare's England* (1886); or to Italy—C. Eliot Norton, *Travel and Study in Italy* (1860); W. D. Howells; W. W. Story, *Roba di Roma* (1862); James Jackson Jarves, *Italian Rambles* (1883); or to Palestine—William McClure Thomson, *The Land and the Book* (1860 and 1880–85); William Cowper Prime, *Tent Life in Palestine* (1859); Henry Clay Trumbull, *Kadesh-Barnea* (1884). Out of these beaten tracks lie Eugene Schuyler's *Turkestan* (1877), Raphael Pumpelly's *Across America and Asia* (1870), William Eliot Griffis' *The Mikado's Empire* (1876), Franz Hassaurek's *Four Years among the Spanish Americans* (1866), Percival Lowell's *Chosön* (1886) and *The Soul of the Far East* (1888), and Julian Hawthorne's *Saxon Studies* (1876). In the closely related field of nature-study, John Burroughs (b. 1837), Charles Conrad Abbott (b. 1843), Harriett (Mann) Miller (b. 1831), and Elaine Goodale (b. 1863) have done admirable work.

In philology George Perkins Marsh (1801–82), William Dwight Whitney (b. 1827), Basil Lanneau Gildersleeve (b. 1839) are but the most eminent names in a group which commands European respect by its achievements in oriental, classical, Romance, and Teutonic fields. Scientific works generally do not fall within the scope of this sketch.

The literary quality of theological writing has been benefited by contact with the Oxford and Broad Church movements of England, and with German masters both in this field and in those of philosophy and philology. From Oxford came the recognition of the intimate relations of beauty to truth and goodness, and disgust for sordidness and meanness in worship. Its influence is seen even in men like Phillips Brooks, the first of American preachers, who have no sympathy with the ideas of the Tractarians, and in the general improvement of the hymnals of the American churches. In writers like Elisha Mulford, *The Nation* and *The Republic of God;* Newman Smyth, *Old Faiths in New Light*, *The Orthodox Theology of To-day*, and *Christian Ethics;* James Freeman Clarke, *Orthodoxy, its Essential Truths and Formal Errors*, and *Ten Great Religions;* Samuel Johnson, *Oriental Religions;* Henry Clay Trumbull, *The Blood Covenant* and *Friendship the Master Passion*, are seen the broadening influence of modern philosophy and sociology on religious thought. In philosophy the era has been notable for naturalisation of the most various schools of thought in America, that of Hegel having the most vogue with the specialists in philosophy, and that of Herbart with the educators. Plato, Berkeley, Schopenhauer, Trendelenburg, Lotze, Wundt, Ulrici, Rosmini, and Spencer have each their following, the last being represented by John Fiske (*Cosmic Philosophy*) and E. L. Youmans. But in most cases these writers care but little for the literary quality of their work, Elisha Mulford, Francis Bowen, Noah Porter, James McCosh, Josiah Royce, and Thomas Davidson (the exponent of Rosmini) being exceptions.

In literary criticism America has made great advances in the arts of just appreciation. Of Mr Lowell's later work in this field it might fairly be said that every new essay was an event. Edward Percy Whipple (1819–86), Edmund C. Stedman, W. D. Howells, Thomas S. Perry (b. 1845), Fred H. Hedge, Richard H. Stoddard, Moses Coit Tyler (b. 1835), Charles F. Richardson (b. 1841), Thomas R. Lounsbury (b. 1838), are only the most prominent names in this field. William John Rolfe (b. 1827) and Horace Howard Furness (b. 1833) have taken high rank as Shakespeare critics.

The present age is one of golden mediocrity in nearly every department. There is danger that it may degenerate into an era of narrow specialists, and to that foreign influences, especially that of Germany in the universities, are tending. There is room to hope that the national energy is but resting and gathering strength for a greater and more productive era.

See M. C. Tyler, *History of American Literature* (2 vols. 1878; new ed. 1881); John Nichol, *American Literature* (1882); C. H. Richardson, *American Literature* (2 vols. 1887–88); Stedman's *Poets of America* (1885); the 'American Men of Letters' series; the *Cyclopædia of American Literature*, edited by Duyckinck (2 vols. 1856; new ed. 1888); and the *Library of American Literature*, by Stedman and Hutchinson (11 vols. 1887–89).

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Units, in scientific language, are the arbitrarily chosen standards in terms of which different quantities are expressed. The idea is familiar in common life. No commercial transaction can be carried out without a clear understanding as to the units employed. The pound, the yard, the mile, the acre, the gallon, the hour, the dollar, and so on, are examples of ordinary units, which have become more and more definitely fixed as civilisation advanced. In these days of scientific exactitude great care must be taken in fixing the units of commerce and in determining the ratios of the units used in different countries for the same commodities. Thus the English pound has a definite relation to the French kilogramme, and the yard to the metre. The relations between money units vary, however, for the reason that the value of money depends on fluctuating commercial conditions. See WEIGHTS AND MEASURES, MONEY, EXCHANGE, BIMETALLISM, CURRENCY.

In science we distinguish fundamental and derived units. The fundamental units are so named because in terms of them all other physical units can be expressed. It has been found convenient to take the units of length, mass, and time as the fundamental units; and the centimetre, gramme, and second have been accepted in this sense by the whole scientific world. As thoroughly scientific a system can of course be based on any other chosen units, such as the foot, pound, and second. From these fundamental units all others are derived by definition. Thus the scientific unit of surface is the square, and the unit of volume the cube, whose side is the unit of length. The English acre and gallon, which have no simple relation to the inch, foot, yard, or mile, are essentially unscientific. Other scientific units, such as those of velocity, force, work, involve in their definitions two or all of the fundamental units. Then a growingly important set of derived units are those of electrical and magnetic quantities, such as the ampere, the ohm, the volt, the watt, and so on. In the accepted scientific system, called for brevity the C.G.S. (Centimetre, Gramme, Second) system, one great merit is its purely decimal character. By an extension of the French method of prefixes (*centi*, *deci*, *kilo*, &c.) we are supplied with an unlimited stock of unit-names. Thus the microfarad is an electric capacity which is one-millionth of the farad, and the megadyne a force equal to one million times the dyne or C.G.S. unit of force. Without such prefixes we should have to use at times either very large or very small numbers; they serve, indeed, the same function as a change from inches to miles, or tons to pounds. A general discussion of the significance of units is given in all our best modern text-books on the various departments of physics. See also Everett's *Units and Physical Constants* (3d ed. 1891); and see ELECTRICITY, FORCE, WATT.

Univalves, in Conchology, molluscs having a shell in one piece, like the Gasteropoda (q.v.), as opposed to Bivalves (q.v.). See also MOLLUSCA.

Universalists, a body of Christians whose distinctive peculiarity consists in their belief that evil will ultimately be eradicated from the world, and that all erring creatures will be brought back to God through the irresistible efficacy of Christ's divine love. This doctrine of Universalism, Restoration, or the Larger Hope is already discussed in the article on HELL (at Vol. V. p. 631), and the names of some of its chief representatives given. The communion bearing this name is mainly an American development, though its foundation is mainly due to the Rev. John Murray (1741–1815), who, having come successively under the influence of Wesley, of Whitefield, and of James Relly, a Universalist preacher in London, arrived in the United States in 1770, and ultimately established a congregation at Gloucester, New Jersey, in 1774. The Tunkers (q.v.) were also Restorationists. But the greatest influence in establishing the Universalist Church was exerted by the Rev. Hosea Ballou (1771–1852), originally a Baptist, born in Richmond, N. H., who taught successively at Dana, Mass., Barnard, Vt., Portsmouth, N. H., Salem, and Boston. Most of these Universalists are also Unitarians, and they hold what are commonly called Pelagian views of sin. The church government is congregationalist. There are between 700 and 800 ministers and about 40,000 members, with four colleges and three theological schools.

See Ballou, *Ancient Universalism* (new ed. 1872); Whittemore, *Modern Universalism* (1830); Thayer, *Theology of Universalism* (1864); and Eddy, *Universalism in America* (2 vols. 1884–86).

Universal Language, a language long dreamt of but as yet uninvented, which should serve as a medium of communication throughout the world for commercial purposes, or for educated men, and which should ultimately supersede the existing languages. Such schemes have been suggested or partly worked out by many ingenious theorists, as by Urquhart (q.v.), Dalgarno (q.v.), Bishop Wilkins (q.v.), Leibnitz (in *De Arte Combinatoria*, sect. 1666), Condorcet (1794), Burja (1818), Stethy (in *Lingua Universalis*, Vienne, 1825), and Steiner (in *Pasilingua*, 1886); and for a time was believed by many to have been realised in Volapük (q.v.). Pigeon-English (see Vol. III. p. 195), and the *Lingua Franca* of the Mediterranean, are partial but spontaneous and actual efforts in the same direction.

Universals. See NOMINALISM.

Universities. Though analogous institutions may be found in classical times, universities to all intents and purposes may be regarded as the distinctive product of the Christian civilisation. As institutions that grew naturally out of the needs of society, indeed, they date from no special moment, and in their earliest developments are without the domain of history. Even when they had assumed a more or less definite form in the different countries where they sprang up, the fluctuating terms by which they were designated prove the gradual and tentative nature of their growth. Even the best-known designation, university (*universitas*), itself varied in meaning, though in prevailing usage it implied simply a corporation of students and teachers. Other terms, such as 'the schools' (*scholæ*), *studium*, *studium generale*, showed a similar tendency to fluctuate in meaning. Thus *studium generale* was variously used to mean a great central school, a school open to all the world, and a school of all knowledge. As was the case with every important institution of the middle ages, the universities looked to the pope as their great head. The right of founding universities, however, was equally claimed by the emperor; and within their own dominions kings enjoyed the same privilege, though royal foundations did not possess all the advantages of such as held papal or imperial charters. Still, the essential distinction between the mediæval and the modern university is that the former was essentially an ecclesiastical institution, whose aims, studies, and privileges were regulated in strict accordance with the temporal and spiritual interests of the church.

At every period of their existence it may be said that universities have fulfilled a double function in the social order. They have been the great training-schools for the different learned professions,

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and they have been the custodiers and exponents of the ideal elements on which society ultimately rests. As the condition of their being, therefore, is to respond to the needs and aspirations of society, the history of universities has of necessity been determined by the revolutions of the human spirit and the changing ideals which men have set themselves to follow. With the Renaissance and the Reformation began a new period in their history; and from the developments of modern science and the increasing complexity of modern life a third period began when a fresh adjustment was needed to meet the ends for which they exist. In these three distinct stages of their development they may be conveniently treated in the following survey.

Though the statement has to be made with certain reserves, it may be said that Italy was the birthplace of the mediæval university. At Salerno in the 9th century there grew up a school whose origin is totally unknown, but which as early as the 11th century was famed throughout Europe for the teaching of medical science. In the 12th century a school of law at Bologna drew crowds of students from every country in Christendom. In the case of both of these schools it would appear that teachers and students drew together solely on the principle of supply and demand; and it remained a distinctive characteristic of the Italian universities that they followed professional as opposed to purely scientific ends. Through certain privileges granted by Frederick Barbarossa in 1158, however, Bologna acquired a definite existence which greatly favoured its prosperous development. In the early middle ages its only rival was the university of Paris; and not even Paris had a greater influence in determining the character of subsequent schools. In aims, studies, organisation, indeed, Paris and Bologna present two distinct types of the mediæval university. Though other disciplines gradually defined themselves into *faculties* at Bologna, its specialty always remained the teaching of the canon and the civil law, while Paris, as we shall see, was identified with another subject, equally one of the great concerns of the middle ages. At Bologna the prevailing aim of the students was to acquire the technicalities of a profession which through the complex municipal life of the Italian cities assured to them both riches and honour. The students who came to Bologna were for the most part men in mature life, and the organisation of the university was largely determined by this circumstance. Coming from all parts of Europe, they in time formed themselves into unions, which eventually became the governing element in the university. By the end of the 12th century these unions may be distinctly traced; and by the middle of the 13th they formed two corporations, known as the *ultramontani* and the *citramontani*, with *rectors* chosen from among themselves and by themselves as their representative heads. As definitively arranged, the external administration of the university was in the hands of the corporations, while the professors directed all matters relating to actual study. In Bologna, as at Paris and Oxford, colleges do not make their appearance till the 14th century, by the later half of which, however, they were already in full bloom. Here we may specially mention the great Spanish college (1364) at Bologna, as being the single specimen of a mediæval college now existing on the Continent. Throughout the middle ages, as has been said, Bologna was one of the two great models which determined the character of later universities. In France, with the exception of Paris, Montpellier, and Perpignan, all the universities (eight in number) were fashioned after the type of Bologna. In the pope's bull which founded it the university of Glasgow is expressly said to be modelled on Bologna; and in Germany, though Paris was mainly kept in view, the Italian university had also its imitators. Before the close of the middle ages Italy possessed as many as twenty-one universities, the majority of which had their origin as late as the 14th century. Modelled on Bologna for the most part, none of them, except perhaps Padua, attained the European reputation of their prototype. As Italy had been the birthplace of the mediæval universities, it was from Italy that the forces came which sapped the foundations on which they had arisen. Out of the Renaissance movement generated in Italy sprang the modern spirit with other aims and needs than mediævalism could meet. During the 14th and 15th centuries, accordingly, the intellectual life of Italy was mainly outside its universities.

The university of Paris sprang up as spontaneously as that of Bologna. As Bologna owed its existence to the study of law, Paris was born of the movement known as Scholasticism (q.v.), which in the 12th century was the absorbing pursuit of the best minds of France. In the opening years of that century the lectures of Abelard, the most famous teacher of his generation, drew to Paris such crowds of hearers that men came naturally to associate that city with the study in which they were most deeply interested. The school attached to the cathedral of Notre Dame appears to have been the nucleus round which the university grew up. It was the chancellor of the cathedral who granted the license to teach, and who remained head of the university till the close of the 13th century, when he was displaced by the *rector*, chosen by a section of the university itself. In contrast to Bologna, the university of Paris was essentially the union of the professors of the different subjects that came to have a place in its studies. In time these disciplines gradually defined themselves into the four *faculties* of law (1213), medicine (1213), arts, and theology—the last being by far the most important of the four, while for two centuries (the 13th and 14th) canon law had no place in the university. The *Nations* of the university also came to make part of its organisation. Originally held together simply by common ties of birth and language, by the middle of the 13th century the students of arts formed four legally constituted bodies known as the nations of France, Normandy, Picardy, and England (afterwards Germany). These four nations, together with the three higher faculties (law theology, medicine), formed what were known as the seven 'companies' of the university; and it was the procurators of the nations and the deans of the faculties with the rector as their president who constituted the university tribunal. As in Bologna, it was not till the 13th century that the system of colleges grew up in Paris. The earliest, as it was by far the most famous, was the Sorbonne (q.v.), founded in 1253. By the end of the 14th century as many as forty colleges, more or less fully equipped, had been founded; and by 1500 there were as many as fifty. The fame of Paris rested on its scholastic theology; with the decay of that study, therefore, it gradually lost its place as the first school in Europe. By the middle of the 14th century it was already noted that she no longer produced the most famous thinkers, or published the most famous books; and when in the opening years of the 16th she rejected the new studies of the Renaissance she alienated all the men with whom the future lay. In the great schism, also, by giving her support to the popes at Avignon, she eventually forfeited the favour of Rome, which thenceforward did its best to encourage rivals even in France itself.

There were other mediæval universities hardly inferior in repute to Paris and Bologna. Sala-

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manca, founded in 1243, was the glory of Spain for nearly five hundred years, though in the peninsula itself it had several competitors, such as Seville, Alcala, Madrid, and Coimbra (or Lisbon). The university of Oxford, however, was the most formidable rival of Paris, and in that very branch of study to which Paris owed its fame. Like the great French and Italian universities, Oxford was a spontaneous growth, whose beginnings cannot be determined with precision, for the story of its foundation by Alfred the Great is now set aside as a legend. In the 12th century, however, Oxford certainly possessed a school, which by the middle of the 13th disputed the palm with Paris both in reputation and in the number of its students. Though to a certain extent standing outside the line of development of the two great continental universities, in its aims, the character of its studies, and its organisation it was essentially formed on the type of Paris. In the same century as they grew up in the French university colleges also arose in Oxford, University College being founded in 1249, Merton in 1264, and Balliol about 1268. Though of later date as a school than Oxford, Cambridge had all the characters of a university as early as 1233. Unfortunate in its earlier developments, however, it was not till a later date that it held its own with its sister university. As was the case with the other universities, the prosperity of Cambridge was materially increased by the growth of colleges, of which the first, that of Peterhouse, was founded by 1286. According to Döllinger, it is an illustration of the practical talent and the political freedom of England that she did not squander her resources in founding other universities besides these two, thus avoiding the needless multiplication of schools which we find in the various continental countries. During the middle ages three Scottish universities, and an abortive one in Ireland, complete the list of schools in the British Islands. The attempt to found a university in Dublin in 1312 came to nothing, for the modern university dates only from 1592. Of the three Scottish universities, St Andrews, Glasgow, and Aberdeen, founded respectively in 1411, 1450, and 1494, St Andrews and Aberdeen attained a prosperity fully proportioned to the resources of the country; Glasgow, on the other hand, was a failure for fully the first century of its existence. Germany, whose universities have held the first place during the 19th century, played only a subordinate part in the development of studies during the middle ages. The oldest university within the empire, that of Prague, founded in 1348 on the model of Paris, at first gave promise of a brilliant history; but the religious wars of Bohemia in the first half of the 15th century proved disastrous to its continued efficiency. Next in date comes Vienna, but, bound as it was to the old ways of scholasticism, at too late a period (1365) to attain the vigour of the earlier universities. Before 1500 there were as many as fourteen German universities, but mostly organised on the model of Paris, which by the 14th century, as we have seen, was already an outgrown institution. The university of Cracow in Poland (1364) grew to such fame during the 15th century that it may be fairly classed among the greater mediæval institutions. Louvain (1426) and Cologne (1388) were also schools of high importance, the former especially from the fact that it was one of the first institutions north of the Alps where the new studies of the revival of learning found a home.

It is from the middle ages that all those terms come—bachelor, master, doctor, rector, chancellor, &c.—which still form part of the academic vocabulary. The origin of the terms *rector* and *chancellor* has already been explained; the import of the others may here be briefly noted. Entering first the faculty of Arts, the student after a three years' curriculum took his *diploma* of *bachelor*, and after continuing his course was at the age of twenty-one in a position to take the degree of *master*, which entitled him to the privilege of teaching in the university. The period of study for *license* in the other faculties varied at different times and in different universities, the longest curriculum of all being that of the doctorate in theology, which could not be taken before the candidate's thirty-fifth year.

With the 16th century begins a new epoch in the history of the human spirit. The end of feudalism, the revival of classical antiquity, the breaking away from Rome of a large section of the Christian society were events that went so deeply into the life of Europe that the ancient universities could not be left untouched by the revolution. But great historical institutions do not readily respond to new aspirations or adapt themselves to novel conditions. To change their subjects of study and reorganise their constitutions meant for the universities the transformation of their very being. As it happened, few of them consented to the transformation, while others made such partial concessions as utterly failed to meet the new conditions. Thenceforward the universities no longer filled their former place in the mind of Europe. Through the rending of the peoples that came of the Protestant revolution they could no longer be metropolitan schools such as Bologna and Paris had been in the middle ages. But even in their respective countries the universities were no longer the exclusive homes of serious intellectual effort. In certain countries, indeed, their course of study remained what it had been from the beginning, and the most important work was done outside their walls. A brief sketch of the history of the universities since the close of the middle ages will bring this very clearly before us.

In Italy the religious revolution was never a serious menace to the authority of Rome. On the other hand, by the beginning of the 16th century the movement of the Renaissance threatened her with moral disintegration and the substitution of the pagan for the Christian spirit. In the second half of the century, however, came the Catholic reaction; the spirit of humanism was sternly repressed; the universities passed completely under the control of the church, and till the last years of the 19th century have remained institutions without any real life, unstirred by any breath of enthusiasm, and powerless to influence the development of the people. A similar history has to be told of the university of Paris. In the first half of the 16th century it rejected the new studies of the Renaissance, and thus fell behind at the very opening of the new era. In the second half the wars of religion brought such disaster to its schools as could never again be wholly repaired. During the following centuries the successive kings of France dictated her studies, controlled her administration, and brought her to such a pass that the Revolution swept her away with other effete institutions.

The universities of England gave a better welcome to the new studies; but to both of them the Reformation, and specially the religious changes under Edward VI., brought such loss of prestige and efficiency as affected their standing throughout all their subsequent history. With the exception of Sir Thomas More, England had no scholar of European importance throughout the 16th century. In the century that followed it was as political rather than educational centres that the universities influenced the movement of things in England; and to what estate they had come in the 18th century the testimony of Gibbon as to Oxford, and the poet Gray as to Cambridge, leave us in no

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manner of doubt. Throughout the same period the universities of Scotland, in proportion to their humbler scale, served far more efficiently their purpose as national institutions. The Scottish reformers set about the work of organising public instruction in a more serious spirit than their contemporaries in England. Many of their schemes miscarried; but they left a stamp upon the universities which for good and evil they have retained ever since. Under Andrew Melville during the later half of the 16th century Glasgow attained a reputation which drew students in considerable numbers from different parts of the Continent. The college of Edinburgh, founded by James VI. in 1582, steadily grew in importance through all the following century. In the first half of that century, however, the university of Aberdeen produced a succession of scholars, 'the Aberdeen doctors,' who for the time made it the first of the four institutions which Scotland now possessed. During the 18th century the lustre of her mathematical school under the Gregorys, and her medical school under the Monros, won the precedence for Edinburgh, and made her known wherever intellectual interests flourished. But the special service of the universities of Scotland has been to supply the want of those secondary schools which the reformers sought to make part of their national system of education, but failed to achieve through the poverty of the country and the selfishness of the leading nobility. Under the existing circumstances this was the highest service the Scottish universities could have done to the country; but with the growth of knowledge during the 19th century this function has gradually disabled them from adequately meeting the modern conception of a fully equipped university.

As we should expect, public instruction was nowhere more radically influenced alike by Reformation and Renaissance than in Germany. The result of the Lutheran revolt was the establishment of a succession of universities, such as Wittenberg (1502), Marburg (1527), Königsberg (1544), Jena (1558), and Altorf (1578), where the new religion as well as the new studies should find a home, and form centres of instruction for the Protestant communities. But the religious controversies issuing in the Thirty Years' War proved fatal to Protestant and Catholic schools alike; and till the close of the 18th century the universities of Germany gave but little promise of the splendid future before them. Since the period of the Reformation the universities of Spain have shared the inanition of the people, and till recent years have pursued the methods and studies of mediævalism with a dogged obscurantism through which no ray of light could penetrate. A notable product of the Reformation was the university of Leyden, founded in 1575 by William of Orange to commemorate the successful defence of the town against the Spaniards. During the 17th and 18th centuries Leyden boasted a line of scholars without a parallel in any other country of Europe.

During the centuries that followed the Reformation the universities, even those that owed their birth to it, continued to retain the character originally impressed upon them. The essential difference between the typical mediæval university and the university formed by the Renaissance was that, while logic formed the educational staple of the one, the Latin and Greek classics took its place in the other. Through the comparative study of other civilisations men were trained to the bolder handling of tradition, and the scientific spirit gradually displaced that of docile submission to authority. With the growth of the new spirit begins a new epoch in the history of universities, which sooner or later must respond to the needs of the society for which they exist. The characteristics of the modern period are the subdivision of studies necessitated by the widened limits of knowledge, the extraordinary developments of physical science, and the increased complexity of the conditions of modern life. Though more gradual in its working, the modern revolution has affected men's aims and interests more powerfully than the religious revolution of the 16th century. If any proof of this were needed, it would be found in the transformations which the universities have undergone to meet the conditions of the modern time.

Germany, which in respect of its universities took the last place in the middle ages, has in the modern period led the way from the first—the conclusive attestation of its pre-eminence being that its schools alone can now be called cosmopolitan. With the foundation of Halle in 1694, and of Göttingen in 1737, their new start seems to have been made, as both of these schools initiated a movement which gradually made itself felt throughout the whole of Germany. Yet, as has been said, the German universities have no brilliant record for the greater part of the 18th century; and it was only towards its close that they decisively took the lead of those of other countries. From the settlement of Friedrich Wilhelm Wolf at Halle in 1783 dates the classical teaching which is one of Germany's special claims to honour. Kant at Königsberg, and Fichte and Schelling at Jena, at the close of the 18th and the beginning of the 19th century, revived that application of dialectics to abstract thinking which was the distinguishing characteristic of the middle ages. But above all the foundation of Berlin University (1810) by Wilhelm von Humboldt made an epoch in the history of universities, from which we may date the ideal of a national school organised to meet the highest aims of the modern spirit. At present Germany possesses 21 universities with an average attendance of nearly 1400 students. Of their expenditure 72 per cent. is contributed by the state, 9·3 by students' fees, the remainder being met by endowments. For every teacher in the German universities the average number of students is 11, while in Scotland the proportion is 1 to 40. The professors are appointed by government, and are of three grades, full professors, extra-ordinary professors, and *privatdocents*. It is in virtue of their splendid organisation, based as it is on an equally comprehensive system of secondary schools, that the universities of Germany have left all others behind in the fame of their teachers and their contributions to the sum of knowledge.

The organisation of higher instruction in France differs from that of every other country. Since the abolition of the university of Paris at the Revolution the term 'university' has in France come to be used simply as synonymous with the entire educational system. Controlled by the minister of Public Instruction, this system includes the faculties of theology, law, medicine, science, and letters, for instruction in which twenty-seven *académies*, variously equipped, are established in the leading cities of the country. In Paris especially there is the most ample provision for all the higher departments of study at the *Facultés libres*, *Collége de France*, *Ecole pratique des hautes Études*, *École spéciale des Langues orientales vivantes*. Of Spain it has only to be said that during the 19th century it has followed the example of France, and that its universities have played no part in the developments of modern thought. In connection with the universities of Italy, of which it is specially noteworthy that the mediæval system of colleges is completely extinct, it now holds good

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in modern times as of the middle ages, that the professional aim prevails over that of pure science. To complete this survey of the continental universities, it may be added that Holland and Russia follow the German model, and that the Russian universities have now decisively taken their place among the schools of Europe.

Like that of other countries, university education in the British Islands has been powerfully influenced by the new forces of the 19th century. The two historic universities, Oxford and Cambridge, have responded to modern needs by such changes as the abolition of religious tests, the diversion of a certain proportion of their endowments to physical science, the system of local examinations, and university extension lectures. The foundation of colleges and universities in certain of the large towns of England are the result of the same tendencies. Durham University (1837), with its physical science college at Newcastle; Victoria University (formerly Owens College), Manchester; University College, Liverpool; Yorkshire College, Leeds; Mason's College, Birmingham; with the Welsh colleges of Lampeter, Cardiff, Bangor, and Aberystwith, sufficiently prove how in England and Wales not less than elsewhere the pressure of modern life has created a new departure in the life of universities. Dundee has a University College. London University (separately dealt with) is mainly a degree-granting body. In the later history of the Scottish universities the Universities (Scotland) Act of 1858 is specially noteworthy as having assigned a common constitution to all of them. The result of the Commission on the Scottish Universities, however, will be the most drastic step yet taken to adapt them to the needs of the time. The multiplication of lecturers, as distinct from the professors, the recasting of the curriculum, the admission of women, the choice of subjects permitted to the student are among the most important changes that will give a new character to their future. In Ireland the wants of the country are met by the university of Dublin, the Royal University of Dublin (purely an examining and degree-giving body), and the colleges of Belfast, Cork, and Galway, a Catholic university endowed by the state being as yet only under discussion. Advocating a teaching university in London, in addition to the institutions the city already possesses, Professor Huxley has thus expressed the difference between the modern and the mediæval ideal of the university. 'The student to whose wants the mediæval university was adjusted looked to the past and sought book-learning, while the modern looks to the future and seeks knowledge of things.' The distinction here made is more trenchant than just, but it suffices to show the distance that has been travelled since Paris with its scholastic theology was the first school in Europe.

The university extension movement for providing the means of higher education for persons of all classes and of both sexes, engaged in the regular occupations of life, is conducted by lecturers giving courses in various populous centres, conducting examinations, and granting certificates. The movement began with Cambridge in 1872, and soon extended to other universities; the London organisation is a large one. Chautauqua (q.v.) maintains a somewhat similar system.

In the United States the titles university and college are used indifferently, the former occasionally even for a college where the course of study is not advanced, and either title for a university in the European sense, with several faculties. A considerable proportion, therefore, of the 415 'colleges' of the republic are universities, whilst a still larger number are simply high-schools. In the best universities, it should be noted, the course of study will bear comparison with any British university at least; elective and post-graduate courses have been introduced in many of the larger colleges. A state university is part of the educational system of most states, and is generally, like most of the newer colleges, open to both sexes. Most of the American colleges, the state universities excepted, were founded as religious institutions, their chief purpose being to train men for the ministry; this applies not only to Harvard, William and Mary, Yale, Princeton, and others founded before the 19th century, but also to many of the later western colleges.

Canada possesses sixteen degree-granting colleges and universities, one at least in every province of the Dominion except British Columbia. The chief are the university of Toronto; M'Gill College, Montreal; Dalhousie University, Halifax; and Laval University (Roman Catholic), at Quebec. There are universities in Sydney, Melbourne, and Adelaide; the university of New Zealand has branches in various towns; since 1873 there is a university of the Cape of Good Hope. India has three principal and two lesser universities.

The more important universities have separate articles (OXFORD, CAMBRIDGE, HARVARD, DUBLIN, EDINBURGH, &c.), or sections in the articles on the towns where they are found; and the articles on the several countries deal with the university system of each.

See Denifle, *Die Entstehung der Universitäten des Mittelalters bis 1400* (vol. i. 1885); for the university of Paris specially, the works of Du Boulay, Crevier, Thurot, and Jourdain; J. Conrad, *German Universities for the last Fifty Years* (Eng. trans. 1885); Georg Kaufmann, *Die Geschichte der Deutschen Universitäten* (vol. i. 1888); S. S. Laurie, *Lectures on the Rise and Early Constitution of Universities;* for Oxford, Anthony Wood, Parker, Maxwell Lyte; for Cambridge, Dyer and Bass Mullinger; Grant, *The Story of the University of Edinburgh; Monumenta Almæ Universitatis Glasguensis;* Spalding, *Fasti Aberdonenses;* Lyon, *History of St Andrews;* Hastings Rashdall, *The Universities of the Middle Ages* (1892); Thwing, *American Colleges* (New York, 1878). Information regarding the teachers and faculties of all the universities in the world is given in the *Minerva* (Strasbourg, annual). Interesting general studies of the functions of universities will be found in Sir William Hamilton's *Discussions,* Mark Pattison's *Suggestions on Academical Organisation,* Matthew Arnold's *Schools and Universities on the Continent,* and Döllinger's *Akademische Vorträge,* vol. ii.

Unleavened Bread. See PASSOVER, HOST.

Unna, a town of Prussia, once a Hanse town, in Westphalia, 15 miles E. of Dortmund. Near by are the famous salt-works of Königsborn, yielding 120,000 cwt. of salt annually. Pop. 8904.

Unreason, ABBOT OF. See FOOLS (FEAST OF).

Unsoundness. See WARRANTY.

Unst. See SHETLAND.

Unterwalden, one of the four 'Forest Cantons' of Switzerland (q.v.), forms part of the hill country which surrounds the Lake of Lucerne; area, 295 sq. m.; pop. (1888) 27,586. Unterwalden is divided into two parts, Upper and Lower; the capital of the Nidwald is Stanz, and of the Obwald Sarnen. See Sowerby's *Forest Cantons* (1892).

Unyanyembe, a district of German East Africa, between Lake Tanganyika and the coast.

Unyoro, a state of Central Africa between Uganda and the Albert Nyanza, with a population of about 1,500,000, who are more uncultured than their neighbours and kinsmen of Uganda.

Upanishad. See VEDA.

Upas (Malay, 'poison') is the name given to various vegetable poisons in the Indian Archipelago, including some kinds of Strychnos. But that best known under this name is the arrow-poison prepared from the gum that exudes from

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incisions in the stem of the Antjar or Anchar tree (*Antiaris toxicaria*), a large tree belonging to the Artocarpaceæ. The portentous tales current in Europe, especially towards the end of the 16th century, and set forth in Erasmus Darwin's *Loves of the Plants*, are mostly baseless inventions—as for example that the atmosphere for miles round a upas tree was deadly to all animal life, and that no other vegetation could flourish near one. It is true that when a tree is felled or its bark much bruised an effluvium issues acrid enough to cause cutaneous eruptions. And it has been suggested as an explanation of the fantastic stories that upas trees grow in a Javanese valley where carbonic acid, in quantities dangerous to animal life, issues from the volcanic soil, as in the Grotto del Cane. But the tree has no such powers.

Upernivik. See GREENLAND.

Upheaval and Subsidence are terms applied to movements of the earth's crust that result in more or less permanent changes of level. Such movements are believed to be due to the sinking in of the crust upon the cooling and contracting nucleus. The crust under such conditions is necessarily subjected to great crush and strain, from which it gets relief, it is thought, by wrinkling—the wrinkles running in linear directions—or by bulging up over much broader areas. Hence two kinds of movement are recognised—(*a*) *linear* or *axial*, to which mountains of elevation owe their origin (see MOUNTAINS), and (*b*) *regional*, affecting broad areas, over which the crust seems to rise or, as the case may be, to sink without much disturbance or tilting of strata, although these may often be more or less fractured and dislocated. Such earth-movements are believed to take place very slowly and gradually as a rule. These are the generally received views; but of late years doubt has been expressed as to whether regional elevation of the crust is possible. The only movements of elevation of which we have obvious evidence are those that give rise to mountain-chains. These movements are *tangential*—the crust is squeezed and puckered up in rapid folds—but a *vertical* uprise of a continental area seems to Professor Suess and others impossible. Probably many of the supposed evidences of regional elevation really point to sinking of the crust under the great oceanic basins. These basins, there is reason to think, are pre-eminently subsiding areas, and if this be so the mere withdrawal of the sea from the continental areas must produce an apparent elevation of the land. Some now begin to suspect, however, that changes of sea-level may also be due to other causes. Thus, Professor Suess—believing that in equatorial regions the sea is upon the whole gaining on the land, while in other latitudes the reverse appears to be the case—points out that this is in harmony with his view of a periodical flux and reflux of the ocean between the equator and the poles. Dr Schmick also thinks that the apparent elevations and depressions of continental areas are the result of secular movements of the hydrosphere, but the sea according to him attains a high level in each hemisphere alternately—the waters being at present heaped up in the southern hemisphere. Others again, as Dr Hilber, have suggested that sinking of the sea-level may be due in part at least to absorption. This recalls the view of Celsius (q.v.), who attributed the retreat of the sea from the coasts of Sweden to gradual desiccation. At present none of the hypotheses that would attribute change of sea-level to secular movements of the hydrosphere has found favour with British geologists, who continue to maintain that all such changes are the result of upheaval and depression of the lithosphere caused by subterranean action. It seems probable that this view will eventually be modified.

Upolu. See SAMOA.

Uppingham, a market-town of Rutland, 2½ miles WNW. of Seaton station, 12 SW. of Stamford, and 83 NNW. of London. The parish church, of which Jeremy Taylor was rector, was restored and in great part rebuilt in 1861; but the feature of Uppingham is its public school, founded in 1584 by Robert Johnson (1540–1625), from 1591 Archdeacon of Leicester. With an endowment of only £1000 a-year, it owes its development from a mere grammar-school to Edward Thring (q.v.), its headmaster from 1853 to 1887. He found it with only twenty-five boarders, and left it with 330; and to him was due the building in 1863, from designs by Street, of the great schoolroom and the decorated chapel, as also of the gymnasium, swimming-bath, &c. Pop. 2500. See the *Century Magazine* for September 1888.

Upsala, the historic centre of ancient Sweden, the principal and last stronghold of heathenism in that country, and still one of the most important towns in Sweden, stands on a little stream that runs down to Lake Mälar, 41 miles by rail N. by W. of Stockholm. Its existing importance is due to its being the seat of the primate, the only archbishop of the Swedish church, and of the principal university. The cathedral, built of brick in the Gothic style, was founded in 1289, completed in 1435, partly burned down in 1702, and only partly restored since that disaster. It contains the tomb of Linnæus, and those of Gustavus Vasa and some other Swedish kings. The university, founded in 1477, though new buildings were erected in 1877, is attended by 1900 students, and possesses a library (1620) of 250,000 volumes and 10,000 MSS., an observatory, botanical garden, and various scientific collections. In the older town, around which on the east and north new suburbs have been built, there stands the castle of Gustavus Vasa (1548). Pop. (1890) 21,511. About 3 miles to the NE. lies OLD UPSALA, where are three vast tumuli of the ancient legendary kings; and about 4 miles to the SE. are the Mora stones, on which the old kings used to take the oaths of good governance.

Ur. See ABRAHAM.

Uræmia. When excretion of waste products from the body by the kidneys is defective, particularly therefore in cases of Bright's disease (see under KIDNEYS), peculiar symptoms, mostly cerebral, are met with, which are commonly called *uræmic*. Among the most characteristic are fits like epileptic seizures, delirium, tremors or spasms of muscles, transient attacks of blindness, dyspnœa, itching, vomiting. It is as yet uncertain whether it is to the urea (as implied by the name) or to others of the retained effete materials that these symptoms are due, which, though not infrequently recovered from, are always cause for grave anxiety.

Ural, a river of Russia, rises on the east side of the Urals in the government of Orenburg, and runs mainly southwards for 800 miles into the Caspian Sea, being practically the boundary between Europe and Asia. It gives name to a province, URALSK, which lies mainly east of the river and north of the Caspian, belonging to the Steppe-region (see RUSSIA, Vol. IX. p. 35) and to the 'Kirghiz provinces' included in Asiatic Russia.

Ural-Altaic, a term given to a racine and linguistic group of peoples of the Mongolic stock, classified at ASIA, Vol. I. p. 493.

Ural Mountains, separating European Russia (physically though not politically) from Siberia, have been described at RUSSIA, Vol. IX. p. 33. The main axis of the series of ridges and plateaus

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consists of granite, diorite, syenite, porphyry, and schistose rocks. The mineral wealth is great, comprising gold, platinum, silver, copper, and iron, besides precious stones, malachite, &c. All the platinum of Russia is found here, and some two-thirds of its pig-iron.

Uralsk, a Russian town, in Uralsk government, on the right bank of the Ural, 280 miles N. of its mouth in the Caspian Sea. It has for centuries been an important seat of the Cossacks, and carries on a busy trade with them and with the western Kirghiz steppes, besides horse-rearing, fisheries, and the preparation of caviare. Pop. 26,054.

Urania. See MUSES.

Uranium (sym. U, equiv. 240) is a very hard but moderately malleable metal, sp. gr. 18·33, resembling nickel or iron in its lustre and colour; but in a finely comminuted state occurring as a black powder. It is not oxidised by exposure to air or water at ordinary temperatures; but if heated in the air it burns brilliantly, and is converted into oxide. It is a comparatively rare metal, which never occurs native; its chief source being *Pitch-blende*, which contains from 40 to 90 per cent. of black oxide. Uranium forms at least four oxides—viz. two principal ones—a *dioxide*, UO_2, and a *uranic oxide*, UO_3; and two intermediate oxides—the *black oxide*, $UO_2 + UO_3$, and the *green oxide*, $UO_2 + 2UO_3$. The black oxide is of much value as a pigment for colouring porcelain; and compounds of uranic oxide with the earths are employed to communicate a peculiar yellow tint to glass. The salts of the dioxide have a green, and those of the trioxide a yellow colour. Uranium with platinum and copper forms two beautiful alloys resembling gold in appearance. The metal is extracted from pitch-blende; and its isolation in a pure form is due to Peligot in 1842. The metal was not obtained in the compact form till 1856; it is found in Saxony, Bohemia, and Cornwall, usually in patches; but in 1889 a continuous lode was found at Union Mine in Cornwall. The price reaches £2400 a ton.

Uranus. See TITANS, PLANETS.

Urari. See CURARI.

Urban, the name of eight popes.—URBAN I. (222–230), an alleged martyr under Alexander Severus.—URBAN II. (1088–99), born near Châtillon-sur-Marne, was originally a monk of Clugny. He was made by Gregory VII. cardinal-bishop of Ostia, and was elected pope in a council held at Terracina in 1088, during the schismatical pontificate of the antipope Guibert, styled Clement III. He laid Henry IV. of Germany under the ban and finally drove him out of Italy, triumphed also by the same means over Philip I. of France, and aroused the crusading spirit by the fire of his eloquence at Piacenza and the Council of Clermont (1095).—URBAN III. (1185–87), Uberto Crivelli, was a Milanese by birth, and consumed his brief reign in a struggle with the Emperor Frederick I.—URBAN IV. (1261–64), Jacques Pantaléon, was a Troyes cobbler's son, the steps of whose elevation were the see of Verdun and the patriarchate of Jerusalem.—URBAN V. (1362–70), William de Grimoard, was a native of Grisac in Languedoc, and had been Abbot of St Victor at Marseilles. On the death of Innocent VI. in 1362 he was elected at Avignon, but set out for Rome in 1367, only to return a few months before his death.—URBAN VI. (1378–89), Bartolommeo Prignani, was born in Naples in 1318, and at the time of his election he was Archbishop of Bari. The French cardinals set up against him the Bishop of Cambray as Clement VII., who took up his residence at Avignon. See ANTIPOPE, and POPE.—URBAN VII., John Baptist Castagna, died twelve days after his election (15th September 1590).—URBAN VIII. (1623–44), Maffeo Barberini, was born at Florence in 1568, and was elected pope in September 1623. He supported Richelieu's policy against Austria and Spain, was a patron of Galileo, canonised Loyola and Philip Neri, and wrote sacred poetry.

Urbana, capital of Champaign county, Ohio, 95 miles by rail NNE. of Cincinnati. It manufactures woollens, carriages, glue, &c. Pop. 6510.

Urbanists. See CLARE (ST).

Urbi et Orbi (Lat., 'to the city and the world'), a form used in the publication of papal bulls, for the purpose of signifying their formal promulgation to the entire Catholic world, as well as to the city of Rome. See also BENEDICTION.

Urbino, an ancient town of Central Italy, in the province of Pesaro and Urbino, nestling among wooded hills, between the rivers Foglia and Metauro, remote from the highways of commerce. The nearest station, Faro (97 miles by rail SE. of Bologna), is 29 miles away. It is a town of narrow, tortuous streets, with an archbishop's cathedral and other churches; a magnificent ducal palace (1447; restored, and now housing the fine art institution); a free university, dating from 1564, but now attracting only eighty students; and the house in which Raphael was born, now the town museum. Cheese, silk, pins, and some majolica ware are manufactured, but not the majolica for which the place was famous for a century and a half after 1475 (see MAJOLICA). Urbino, anciently the Urbinum Hortense of Umbria, was a *municipium* under the Romans and was the seat of a line of independent dukes from 1474 to 1631. On the death then of the last duke, Urban VIII. took possession of the duchy as a vacant fief; and it belonged to the Papal States till 1860, when it became part of the kingdom of Italy. Pop. 5087.

Urchin. See HEDGEHOG, SEA-URCHINS.

Urdú. See INDIA, Vol. VI. p. 102.

Ure, ANDREW, M.D., chemist, was born at Glasgow in 1778, and educated at the university there. In 1802 he became professor of Chemistry and Natural Philosophy in the Andersonian Institution in Glasgow, and a few years later became first astronomer in the city observatory. In 1813 he published a *Table of the Materia Medica*, but achieved a more lasting reputation by researches on Caloric (in *Phil. Trans.*, 1818). Later works were his *Dictionary of Chemistry* (1821); a translation of Berthollet on *Dyeing* (1824); and a *System of Geology* (1829), in which the hypothesis of a general Flood was maintained. In 1830 Ure removed to London, and in 1834 was appointed analytical chemist to the Board of Customs. He was already F.R.S. in 1822, and he died in London, January 2, 1857. His latest books were the *Philosophy of Manufactures* (1835), *The Cotton Manufacture of Great Britain* (1836), and *Dictionary of Arts, Manufactures, and Mines* (1839; 7th ed. 4 vols. 1875–78).

Uredineæ. See FUNGI, PLANTS, p. 223.

Urethra is the term given in Anatomy to the canal by which the urine is discharged from the bladder. Its most common affections are the special inflammatory condition of its mucous lining known as gonorrhœa, and Stricture (q.v.).—For the Ureter, see KIDNEYS.

Urfa, a modern name for Edessa (q.v.).

Urfé. See D'URFEY.

Urga, a town of Mongolia, on the river Tola, stands in a valley in the great Asiatic plateau, 180 miles SE. of Kiachta, on the trade route to Peking. It is the seat of government for northern Mongolia,

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has considerable trade, and a population (partly living in tents outside the city proper) of about 30,000, of whom 6000 or 7000 are Chinese. In one of the suburbs of the town is a college of Mongolian priests, which is the seat of the Bogdan or Lama of the Mongols (see LAMAISM).

Urgel (or Leo de Urgel), a small mountain town of 2392 inhabitants, in the Catalonian province of Lerida, at the foot of the Pyrenees. Its bishops have extensive powers in the adjoining republic of Andorra (q.v.).

Urgenj. See KHIVA.

Uri, one of the 'Forest Cantons' of Switzerland, forms part of the hill country which surrounds the Lake of Lucerne; area, 416 sq. m.; pop. (1888) 17,284. It consists of one valley, that of the Reuss, through which runs the great road, and also the railway, into Italy by the St Gothard Pass. Uri is almost entirely pastoral; and the constitution is a pure democracy (see SWITZERLAND, p. 22). Altorf, with traditions of Tell (q.v.), is the capital. See Sowerby, *The Forest Cantons of Switzerland* (1892).

Uriconium. See WROXETER.

Urie. See INVERURIE.

Uriel, or ORGIAL. See LOUTH.

Urim and Thummim (Heb.), first mentioned in Exod. xxviii. 30 in connection with the High-priest's breast-plate, apparently a pair of objects used at critical junctures as a kind of traditional oracle, but which could not always be counted on for an answer (1 Sam. xxviii. 6). They were wanting to the High-priest after the Captivity (Ezra, ii. 63). The LXX. translation of these words is δήλωσις καὶ ἀλήθεια; the Vulgate, *Doctrina et Veritas.*

Urine is the fluid which is secreted or separated by the kidneys from the blood, and it is the principal means of removing the worn-out tissues, especially the nitrogenous and saline matters, from the system. It is a very complex fluid, and its composition varies considerably in different classes of animals—among the mammalia mainly in accordance with the nature of the food. The study of its modifications in disease forms a most important branch of medical work.

Healthy human urine, when freshly discharged, is a clear fluid of a bright amber colour, a bitter, saltish taste, and a peculiar aromatic odour. Its normal reaction is acid, and its specific gravity ranges from 1·015 to 1·025. A healthy adult man passes on an average about 50 fluid ounces (2½ pints) of urine in twenty-four hours; but the amount is subject to very great variation, being diminished during sweating or thirst, and increased under the influence of cold, by copious draughts of fluid, and by large quantities of salt or sugar, as well as many drugs. The solid constituents of the daily urine weigh a little more than two ounces, of which about half is urea. The other substances present are, in the order of quantity, common salt (sodic chloride), phosphates, sulphates, uric and hippuric acids, with others of less importance (mucus, colouring matters, &c.). The amount of solids, and the amount of urea excreted per day, are less subject to variation in health than the whole amount of urine; careful observations of the daily excretion of urea are of special importance in the investigation of disease.

Urea (chemical formula, CON_2H_4) is the form in which the great bulk of the nitrogenous waste of the human body is removed. It is formed in the tissues during the disintegration of proteid material, and carried by the blood to the kidneys, which separate it and pass it off in the urine. It is very readily soluble in water; it gives rise to carbonic acid and ammonia during ordinary decomposition. It is of great interest chemically, being the first animal product which has been produced by synthesis from inorganic bodies without the intervention of animals.

Uric acid, $C_5H_4N_4O_3$, is present in small amount in the blood and in normal urine, chiefly in combination with alkaline bases. It is very much less soluble in water than urea; its presence in excess in the blood is the chief feature of the gouty state. In birds and reptiles, however, the nitrogenous waste is excreted chiefly in this form.

Hippuric acid, $C_9H_9NO_3$, is usually present in still smaller quantity in human urine; but in considerable amount in the urine of herbivora.

Of *abnormal constituents dissolved* in urine the most frequent is *albumen* (see KIDNEYS, DISEASES OF). It causes no change in the appearance of the urine; but is visible as a white precipitate, insoluble in dilute acids, on boiling, or on the addition to the urine of certain reagents (e.g. strong nitric acid, solution of picric acid). *Sugar* is excreted in considerable quantity in Diabetes (q.v.) Mellitus. *Bile* is present in cases of jaundice, giving the urine a deep yellow, brown, or almost black colour. *Blood-pigment* may be present without blood-corpuscles, but more commonly as a result of the escape of blood from the vessels in some part of the urinary tract. It may give the urine either a bright red or a 'smoky' tint.

Urinary Deposits.—When normal urine is allowed to stand in a clear glass vessel for some hours, a faint cloudy deposit appears at the lower part, consisting chiefly of mucus from the bladder. When the urine is much concentrated, as it often is in hot weather, a dense yellow or reddish deposit frequently appears as it cools, readily soluble on heating. This consists of urates, and is generally of no particular importance; but it may be an indication of digestive disturbance. When from administration of alkalies or otherwise the urine is alkaline, a white deposit of phosphates may be seen, readily dissolved by acids. If habitually present, it may arise from an unhealthy condition of the bladder. Small red 'cayenne-pepper' grains consist of uric acid, and indicate its presence in excess. Larger particles (gravel) are sometimes passed; if retained in the bladder they lead to the formation of a Calculus (q.v.). Casts of the kidney tubules in Bright's disease, pus from the kidney or bladder, and blood are distinct indications of disease in the urinary tract. They are best recognised under the microscope. Numerous other deposits are occasionally met with, but they are not of any general interest.

Incontinence of Urine, or *Enuresis,* is a troublesome affection, far more common in childhood than in more advanced life, and in boys than in girls. The child may have no bad symptom of any kind that can be detected, but it is in the constant habit of discharging its urine in bed during sleep. The act may take place once or several times during the night, and sometimes there is an interval of a night, but seldom more. The child may often be broken off this unpleasant habit by proper domestic management, as withholding any excess of fluids before going to bed, and waking it, and making it discharge the contents of the bladder at the time when the elder members of the family retire to bed. Some hard substance—e.g. a cotton-reel in a towel—fixed over the spine, so as to prevent the little patient from lying on its back, sometimes has a good effect. When such means as these fail, recourse must be had to medical advice. Some slight abnormality in the urinary organs is frequently present, the correcting of which cures the complaint. Cold douches to the spine, combined with

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the internal use of chalybeates, are frequently serviceable. The most certain remedy, however, is extract of belladonna, given at first, according to the age of the patient, in doses varying from $\frac{1}{12}$th to $\frac{1}{4}$th of a grain, twice daily, and increased, if required, till it gives rise to marked constitutional disturbance. The various forms of mechanical pressure that have been suggested, with the view of preventing the passage of the urine, cannot be too strongly reprobated. The same remark applies to the too common practice of punishing the unfortunate child for a condition which is utterly beyond its control, and deserves pity rather than chastisement.

Retention of Urine is the term employed in medicine to signify a want of power to discharge the urine from the bladder, and it must be carefully distinguished from a far more serious affection known as *suppression of urine*, in which also no urine is passed, because in this case there is none in the bladder. Retention may arise from Stricture (q.v.) in any of its forms; from some mechanical obstacle in the urethra, a tumour, calculus, clot of blood, &c.; from enlargement of the prostate gland; from want of power in the bladder; or by reflex nervous influence, either owing to some painful condition in the urinary or adjacent organs, or owing to a hysterical condition in the patient. The patient finds himself unable to pass his water, although he has a great desire and makes strong efforts to do so. The bladder soon becomes so distended that it can be felt as a tense round tumour above the pubes. If relief be not speedily afforded, the bladder may burst, and discharge its contents into the peritoneal cavity, in which case death rapidly ensues; or if the urethra be obstructed, it may give way behind the stricture, when the urine is extravasated into the cellular tissue of the adjacent parts—a condition which, if not promptly relieved by surgical interference, is likely to be followed by gangrene, typhoid symptoms, and death.

If the symptoms are not very severe, and there is no evidence of impassable obstruction, a hot bath, combined with the administration of steel-drops, in doses of ten minims, taken every ten minutes in thin gruel or in barley-water, will often give relief. Sometimes a full opiate administered by the mouth, or preferably as an enema, or the inhalation of a few whiffs of chloroform, will, by allaying spasm, give immediate relief. If these means fail, surgical assistance must be at once procured, and the bladder evacuated by a catheter—an operation often requiring very delicate manipulation. If this cannot be done, which rarely happens, except when the spasm is associated with old-standing disease of the urethra, the surgeon must either puncture the bladder through the rectum, or above the pubes, or make an incision into the urethra either at or behind the seat of the stricture. In cases of enlarged prostate permanent relief can sometimes be afforded by operation; but in most cases the patient is taught to use a catheter for himself, and thereby prevented from the danger of a recurrence of the retention.

Paralysis of the muscular coat of the bladder may arise from the debility of old age, from the depressed state of the nervous system in severe fevers, from injury or disease of the head or spine, and from various other causes. In a temporary form it is often a result of over-distention of the bladder from stricture or prostatic disease, and it sometimes occurs in the case of nervous sedentary persons, if they have allowed rather more than the usual time to elapse without evacuating the bladder. It should be generally known that retention of urine from paralysis, or even from incomplete obstruction, is sometimes accompanied by dribbling away of the water, so that the retention might at first sight be mistaken for *incontinence* of urine. On examination, however, it will be found that the bladder is abnormally distended, and cannot be evacuated by the act and will of the patient. In these cases the urine must for a time be regularly drawn away by the catheter. General tonics, such as the cold bath (or sometimes preferably the sitz-bath) and chalybeates, must be given to improve the general health; while medicines which are supposed to act locally on the muscular coat of the bladder or on the spinal cord must be simultaneously administered. A peculiar form of retention sometimes occurs in women of hysterical temperament, in which the will rather than the power is at fault.

Frequent and Painful Micturition may be a symptom of disease of the kidneys, the bladder, or some neighbouring organ, but is very often merely an indication of an abnormally concentrated, acid, and irritating condition of the urine, which causes excessive stimulation of the bladder and urethra. Persons suffering from this affection usually refrain from drinking fluid under the mistaken idea that a diminution in the quantity of urine to be passed will diminish their discomfort. The right course is exactly the opposite; for the more the urine is increased in quantity in such a case, the more its irritating constituents are diluted, and the less pain and annoyance it causes. Free drinking of diluents is often sufficient of itself to remedy the condition.

Strangury (Gr. *strangx*, 'that which oozes out,' *oureō*, 'I micturate') is a symptom of many diseases of the urinary organs (calculus, inflammation of the bladder, gonorrhœa, stricture, &c.). It shows itself in a frequent and irresistible desire to pass water, which is discharged in very small quantity, but causes scalding and cutting pains along the course of the urethra. The pain often extends to the bladder and even to the kidneys, and is sometimes so severe as to implicate the lower bowel (the rectum), and to produce the straining condition known as *Tenesmus*. It may also be caused by irritating substances in the urine, especially by *cantharides* or Spanish flies (whose irritant principle is liable to find its way into the renal secretion, whether the above-named drug is taken internally or merely applied to the skin as a blistering agent), and by oil of turpentine, when administered internally. Treatment must of course be directed if possible to the cause of the condition. But among measures generally beneficial may be mentioned a drachm of laudanum in a wineglassful of starch mucilage thrown into the lower bowel, copious mild mucilaginous draughts (of barley-water, for example), the warm bath, and, if that cannot readily be obtained, hot local fomentations.

Urmia. See URUMIAH.

Urn, any vase; but specially a cinerary urn, the vase, of clay, glass, or sculptured marble, in which peoples who practised cremation preserved the ashes of their dead. The forms and patterns in use amongst the prehistoric northern nations differed widely from those found in Roman tombs; nor did any one type prevail even in Rome. See BURIAL, CREMATION.

Urodela. See AMPHIBIA.

Uromastix. See AGAMIDÆ.

Urquhart, SIR THOMAS, of Cromarty (1605–60), miscellaneous writer, eldest son of Sir Thomas Urquhart, head of an old family possessed of extensive estates in that county, was born about 1605. He was educated at King's College, Aberdeen, travelled in France, Spain, and Italy, and there (according to his own account) acquired a perfect knowledge of foreign languages and

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great skill in fencing. On his return he bitterly opposed the covenanting party, took up arms against them in the north, but was worsted and forced to pass to England by sea. Becoming attached to the court, he was knighted at Whitehall, 7th April 1641. The same year he published his *Epigrams Divine and Moral*, dedicated to the Marquis of Hamilton. This contains only three of the ten books he wrote. He brags of having 'contryved, blocked, and digested those eleven hundreth epigrams in a thirteen weeks tyme.' Its speed proves, he thinks, his 'great maturetie and promptness of wit.' But the pieces written in Latin and English, though quaint, have no real merit. On his father's death in 1642 Urquhart found the estate he inherited much encumbered, whereupon, 'I, as I had done many times before, betook myself to my hazards abroad.' Returning after some years, he fixed his residence at Cromarty. Here, though much troubled by his creditors, he produced his *Trissotetras; or a most exquisite Table for resolving all manner of Triangles*, &c. (1645), a curious but useless mathematical treatise.

In 1649 his library, 'compiled (like a compleat nosegay) of flowers, which on my travels I had gathered out of the gardens of above sixteen several kingdoms,' was seized and sold. He took up arms in the royal cause, was declared a rebel by parliament, was present at the battle of Worcester, where he lost most of his MSS., 'seven large portmantles full of precious commodity.' One treatise hastily seized 'by a file of musquettiers to afford smoak to their pipes of tobacco,' was rescued by a friendly officer. Urquhart was removed to London, where through Cromwell's influence he was allowed considerable liberty. There in 1652 he published *The Pedigree* and *The Jewel* (the full titles are too long to quote). The first was an exact account of the Urquhart family, in which they are traced back to Adam. Among his ancestors were 'the sister of Spartus that built Lacedemon, Pharaoh's daughter, and Panthea, daughter of Deucalion and Pirra.' The second is chiefly a panegyric on the Scots nation. Its account of the soldiers and scholars of the period is still of value. In 1653 he issued his *Introduction to the Universal Language*, which 'for variety of diction in each part of speech surmounteth all the languages of the world.' The 'longings of the generous reader' were to be satisfied by fuller treatises which never appeared. The same year we have his version of the first two books of *Rabelais*. The translation of the third was not issued till after his death. This is said to have occurred in 1660 abroad (whither he had escaped), in a fit of laughter on hearing of the restoration of Charles II.

Urquhart's works are a strange mixture. The learning is enormous, yet the scholarship is inaccurate. He is very industrious, yet very slovenly. Crazy with conceit, he yet evinces a true appreciation of all that is noble. Though a clumsy writer, he has many phrases of quaint felicity, many passages of great power. His rendering of *Rabelais* is an English classic. The extravagance, the grotesqueness, the wild humour, the wisdom of the great Frenchman had a peculiar attraction for the Scottish cavalier. It must be added that he amplifies and lingers over the grosser passages with a gusto there is no mistaking. His extraordinary acquaintance with strange English words is not less remarkable than his command over his author's language.

See his *Works* in Maitland Club Publications (1834). Editions of his *Rabelais* are numerous. An expurgated version was edited by Professor Morley in 1883. See, too, Hugh Miller's *Scenes and Legends*.

Ursa Major, 'the Greater Bear,' and **Ursa Minor,** 'the Lesser Bear,' are two celebrated constellations in the northern hemisphere of the heavens. *Ursa Major* was distinguished as early as the time of Homer by the names *Arktos*, 'the Bear,' and *Hamaxa*, 'the Wagon,' the vivid imagination of the Greeks discovering a fanciful resemblance between these objects and the group of brilliant stars in this constellation. The Roman name Ursa was a translation of the Greek *Arktos;* the Romans also called its seven bright stars the *Septentriones*, 'the seven ploughing oxen,' whence the adjective *septentrionalis* came to signify north. The common names throughout Europe for these seven stars are 'the Plough,' 'Charles's (Charlemagne's) Wain,' 'the Wagon'—evidently derived from the classical epithets above mentioned; the common American name is 'the Dipper.' The remarkable group of stars in the hinder part of the Great Bear, being within 40° of the north pole, never sinks below the horizon of any place in a higher north latitude than 40°, a peculiarity alluded to by Ovid in his *Metamorphoses*. It contains a considerable number of stars, seventeen of which are easily visible to the naked eye; but of these only one (α) is of the first magnitude, two (β and γ) of the second, and eight (among whom are δ, ϵ, ζ, and η) of the third. The accompanying figure shows the arrangement of the seven stars constituting 'the Plough.' α and β are known as 'the Pointers' from their use in detecting the *Pole-star* (q.v.). A line drawn from the Pole-star through η of the Great Bear, and produced its own length, passes close to the star Arcturus of the first magnitude.—*Ursa Minor* is less prominent in the heavens. It was also *Arktos* and *Hamaxa* among the Greeks, but was besides distinctively denominated *Cynosura*, 'the Dog's Tail,' from the circular sweep formed by three of the stars in it. The star α in the extremity of the tail of the Little Bear, at present the Pole-star (q.v.), is the brightest in the constellation, though only of the third magnitude.

Ursa Major.

According to a Greek legend Ursa Major was the metamorphosis of Callisto, one of Diana's nymphs, who having violated her vow, and being transformed by her indignant mistress into a bear, was slain by her son Arcas, and afterwards transferred to the heavens as a constellation by Zeus; Arcas being at the same time metamorphosed into Boötes, the Arktophylax, 'Bear-warden,' of the Greeks. See STARS.

Urson (*Erethizon dorsatus*), a rodent nearly allied to the Porcupine, and often called the Canada Porcupine. About the size of a small hare, it differs from the porcupine in the flatter head, the shorter and not convex snout, the longer tail, and in having the short spines almost hidden by the long hair. It is found in the forests of Canada and the United States. Its quills are dyed by the Indian women, and used for ornamental purposes.

Ursula, ST, a celebrated saint and martyr of the Roman calendar (October 21), especially honoured at Cologne, the reputed place of her martyrdom. The legend in its present form is found as far back as the 12th-century *Chronicle* of Sigebert of Gemblours, and fills 230 folio pages in the Bollandist *Acta Sanctorum*. Here Ursula is the daughter of a British king, and is sought in

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marriage by the son of a heathen prince. She made it a condition that her suitor should become a Christian, and that she should be allowed a space of three years to make a voyage of pious pilgrimage with her maidens, 11,000 in number. She sailed up the Rhine to Cologne, thence to Basel, travelling thence to Rome. Returning to Cologne, the pious virgins fell into the hands of a horde of Huns, who put them all to the sword save Ursula herself, reserved as a prize for the chief. But she demanded to join her companions in martyrdom, and thus the full tale of victims was made up. The centuriators of Magdeburg exposed this ridiculous story; the Jesuit Crombach devoted an entire folio volume to its defence (1647). One explanation offered is that this belief arose from the name of a virgin who was really the companion of Ursula's martyrdom—*Undecimilla*. The record of the martyrdom in the calendar thus being 'Ursula et *Undecimilla VV.*,' 'Ursula and Undecimilla Virgins,' was easily mistaken for 'Ursula et *undecim millia VV.*,' 'Ursula and *eleven thousand virgins*.' Or again the entry might have been 'Ursula et XI.M.V.,' where M. being misread for *millia* not *martyres* gave 'Ursula and 11,000 virgins,' instead of 'Ursula and 11 martyr virgins.' Early in the 12th century the citizens of Cologne in digging foundations for their new walls across the cemetery of the old Roman settlement of *Colonia Agrippina* naturally enough found a large number of bones. These were declared by an ecstatic nun of Schönau, Elizabeth by name, to be the relics of the virgins. Unhappily many of these were soon discovered to be the bones of males, but the nun redeemed the reputation of the virgins by discovering in a series of fresh visions that a pope of the name of Cyriacus, an archbishop, several cardinals, bishops, and priests had been so charmed by the holiness of the lovely virgins as to follow them to Cologne, only to gain for themselves also the martyr's crown. But still worse, a number of young children's bones were found, and unhappily the ecstatic nun was now dead. This compromising fact, however, was explained by a vision vouchsafed to a patriotic English monk of Arnsberg to the effect that many of their married relations had accompanied the virgins on the voyage from England. But, as Schade first pointed out (*Die Sage von der heiligen Ursula*, Han. 1854), Ursula is none other than a Christianised survival of old German paganism still remembered under the names of Berchta, Hulda; in Swabia, Ursel or Hörsel; and in Sweden, 'Old Urschel.'

See, besides the work by Schade mentioned above, Kessel, *St Ursula und ihre Gesellschaft* (Col. 1863); Stein, *Die heilige Ursula* (ib. 1879); and S. Baring-Gould's *Popular Myths of the Middle Ages*.

Ursulines, a female teaching order in the Roman Catholic Church, founded by St Angela Merici of Brescia in 1537, who was born at Desenzano in 1470, died in 1540, and was formally canonised in 1807. She formed at Brescia an association of young women for the tending of the sick and poor, and the instruction of children, and papal confirmation of the order was obtained from Paul III. in 1544. In 1565 a house was opened at Cremona, and St Charles Borromeo brought the order to Milan. In France one of its most distinguished members was the celebrated Madeleine de Ste Beuve, who endowed an Ursuline house at Paris in 1610. Here they first adopted the common life instead of dispersion in various homes. They were introduced into Savoy by St Francis de Sales in 1635. They spread also over Germany, Austria, and in the fullness of time Canada and the United States. An establishment was founded at Edinburgh in 1836, being the first Catholic convent in Scotland since the Reformation. See French works on the foundress and the order by Sainte-Foi (1858), Postel (1879 *et seq.*), and At (1885).

Urticaceæ, a natural order of trees, shrubs, and herbs, natives of almost all parts of the world. The order embraces about 110 genera, divided into 8 tribes or sub-orders, and about 1500 species. The tribes are Artocarpeæ, which includes the Bread-fruit Tree (*Artocarpus incisa*); Cannabineæ, which is represented by Hemp (q.v.); Celtideæ, the principal representative of which is the Nettle-tree (*Celtis australis*); Conocephaleæ, to which no interest attaches; Moreæ, to which belongs the Mulberry (q.v.); Thelygoneæ, including nothing of interest; Ulmeæ, represented by the Elm (q.v.); and Urticeæ, which comprises the Stinging Nettle, the Fig (q.v.), &c.

Uruguay (officially, *República Oriental del Uruguay*; formerly known as the *Banda Oriental* or 'Eastern Bank'—i.e. of the Uruguay) is the smallest of the South American republics, although its area—72,110 sq. m.—is three-fifths that of the United Kingdom and exceeds that of the New England states and Maryland together. Its general outline is that of a pear, the sides marked by the Uruguay River and the rivers and chain of hills which, with the Lagoa Mirim, form the boundary line with Brazil. The Atlantic washes its shores for 120 miles, the Plate and Uruguay for nearly 600 miles. The most important of the numerous rivers of the interior is the Rio Negro, which flows across the central portion. The country is not mountainous, but full of low hills, often forming long ranges, the highest reaching only 1650 feet. Gneiss and granite predominate in the north, and elsewhere porphyry and sandstone. Gold and copper mines are being worked, and other minerals more or less abundant are silver, iron, tin, mercury, mica, beautiful marbles, slate, gypsum, cobalt, and columbite; diamonds also have been found in Minas. But little has been done so far to exploit the mineral wealth of the country. Uruguay enjoys on the whole a delightful climate; the temperature normally does not fall below 35° nor rise much above 90° F. The flora includes many useful trees, amongst them the palm, brilliant flowers, and a host of medicinal plants. Of the fauna may be mentioned the jaguar and puma, the wild cat, tapir, deer, rhea, parakeets, humming-birds, plentiful waterfowl in the lagoons, and snakes (rattle-snake, a cross-marked viper, &c.), lizards, and venomous spiders.

The population, estimated at 684,000 in 1889, and again at 730,000 in 1892, is made up mainly of half-breeds, from whom the Gauchos (q.v.) are drawn; but the foreign element, in which Basques and Italians are most prominent, is rapidly increasing. In 1891 more than two-thirds of all the children born had foreign blood on the side of one at least of their parents. The leading industry is still the raising of cattle and sheep, the latter mainly in the south and west. Six-sevenths of all the exports are embraced under the head of pastoral and saladero produce. Liebig's factory is at Fray Bentos (q.v.). Uruguay possesses some 16,000,000 head of sheep and 6,000,000 of cattle, valued at over $76,000,000. Agriculture takes up only 1,500,000 acres, mostly under wheat and maize, though tobacco, grapes, and olives also are grown. There are several agricultural colonies, chiefly Swiss, Spanish, and Italian. The manufactories are limited to those of Montevideo and a few breweries, flour-mills, &c. throughout the country. The foreign trade on the whole has largely increased within late years; but it fluctuates with the sense of public security, and unfortunately financial as well as political scares have helped to unsettle this. In 1890 the imports

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reached $32,364,627, and the exports $29,085,519; compare with these the figures for 1891—imports $18,900,000, and exports $26,900,000—the fall being due to a financial crisis involving the readjustment of the public debt. Yet even the latter year shows an average of £12, 12s. per head of population, as against £9 for the Argentine Republic. Even without taking into account its mineral wealth, which at present is estimated according to the individual imagination, the country is very rich in natural products, and has nothing against it except its government.

This may be summed up as a sham constitutionalism, in spite of the honest efforts of many of the senators and representatives. Uruguay is divided into nineteen departments, for each of which a senator is returned by an electoral college chosen by the people. Senators are elected for six years, members of the lower house (in the proportion of one for every 3000 male adults who can read and write) for three years. The president is elected for four years, and with a strong military force he is practically master of the country: arbitrary arrests and imprisonment without trial are endured; and even the scandal connected with the sacking of the National Bank failed to unseat President Herrera in 1892. The army, whose influence with the executive is very great, numbers 3500 men, well armed; and there is an armed police force of 4000, besides a citizen force. The navy has only 185 men and officers, manning three gunboats, seven steamers, &c. The revenue in the years 1885–89 crept up from $13,719,693 to $15,690,294, while the expenditure remained between $13,000,000 and $14,000,000. But financial incapacity raised the public debt within even fewer years from $81,000,000 to $106,000,000 in 1891; the debt, however, was readjusted, and part of it converted in 1892. Primary education is compulsory: at the end of 1891 there were 14,370 children inscribed in the public schools (68, with 298 teachers); and there are besides numerous private schools, religious seminaries, a military college, a normal school, school of arts and trades, and a university in Montevideo. The state religion is Roman Catholic, but all are tolerated; Catholics outnumber Protestants as eighty to one. Over 700 miles of railway were open in 1891, and 400 in construction; and there were 2352 miles of telegraph lines. The chief towns, Montevideo, Paysandú, Colonia, Minas, &c., have separate articles.

The history of all the Plate states is woven of the same materials, mostly in the same colours and patterns, and largely in one piece. Uruguay is mainly distinguished as in its earliest years a bone of contention between the Portuguese and Spaniards, and afterwards between Brazil and Argentina. The Portuguese founded the town of Colonia, opposite Buenos Ayres, at the beginning of the 17th century, when the king of Spain, to protect the trade of Peru, had limited the Buenos Ayres exports to 16,000 bushels of wheat and 25 tons each of salted beef and of tallow; and by this means much contraband trade was drawn off to Brazil, until in 1724 the governor of Buenos Ayres founded Montevideo to checkmate the Portuguese colonists. This city was carried by assault by General Whitelocke in 1807, but evacuated after his defeat at Buenos Ayres; and, during the years of revolt from the mother-country, the royal forces held it until 1814, in which year Uruguay was recognised by the congress of Tucuman as independent. Brazil, however, had at once after the Spanish evacuation seized on Montevideo, and occupied the country as the Cisplatine Province until 1825. Then Argentina, resenting this occupation, laid claim to the territory, and in the war which followed, aided by the Uruguayans (see TREINTA Y TRES), defeated both the Brazilian army and navy, till in 1828 the two powers agreed to guarantee the independence of the little republic. But its proximity to Buenos Ayres made it too easy and popular a refuge from the tyranny of the dictator Rosas, and drew down upon it his vengeance (see ROSAS). In the long wars which followed 1839 the chief event is the more than eight years' siege desperately but successfully endured by Montevideo, to whose aid came Garibaldi (q.v.). Rosas fled in 1852, and in the next eight years Uruguay enjoyed eight changes of governors. Then Brazil intervened and placed General Flores at the head of affairs; and from 1864 to 1870 the republic joined with Brazil and Argentina in the disastrous war against Paraguay, Flores being assassinated in 1868. For nearly twenty years after the republic was misgoverned by a succession of political gangs who shamelessly plundered it during their more or less brief periods of power: how far matters have improved since it might be rash to say. Yet, with the help of immigration and private enterprise, something has been done, in spite of jobbery and misrule, to develop the country.

See Mulhall's *Handbook of the River Plate*, and Levey's *Handy Guide to the River Plate* (2d ed. 1890); Diaz, *Notice Historique* (Paris, 1878); Van Bruyssel, *La République Orientale de l'Uruguay* (Brussels, 1889); also histories by F. Bauza (Spanish period; Montevideo, 1880) and De Maria (ib. 1864). *The Purple Land that England Lost*, by W. H. Hudson (1885), is readable, and gives a picture of the country in the period after Rosas.

Uruguay River rises in the Sierra do Mar in the Brazilian state of Santa Catharina, and flows in a swift course west and south to form with the Paraná the Plate estuary (see LA PLATA). It separates Brazil and Uruguay from the Argentine provinces, and has a course of nearly 1000 miles. It is encumbered by numerous rapids, but it is navigable for vessels to Salto (200 miles), and above this point steamers run as far as Paso San Isidro.

Urumiah, or URMIA, a town of the Persian province of Azerbijan, 10 miles W. of the lake of Urmia, in a wide and fertile plain; pop. 32,000. Urumiah, the seat of a Nestorian bishop, and of American and Anglican missions, was said to be the birthplace of Zoroaster (q.v.). The Lake of Urmia (4500 feet above the sea), lying in a depression between the Kurdish mountains and the hills that bound the south end of the Caspian Sea, is about 90 miles by 25, and contains numerous islands. It has no outlet, but has many feeders, some 80 to 150 miles long; the water is intensely salt, on an average only 12 or 15 feet deep, the greatest depth sounded as yet being 40 feet; fish are not found, but plenty of small crustaceans, on which various kinds of water-birds feed.

Urumtsi, the most important city in the Chinese territory of Zungaria, at the northern base of the Tian-Shan Mountains. It is in a fertile district, commands the principal route from Mongolia into Eastern Turkestan, and has a large trade with all the adjoining lands. Pop. 20,000–30,000.

Urus (*Bos taurus*), the Latin name for the wild ox, which in the time of Julius Cæsar (see *Bell. Gall.* vi. 28) was abundant in European forests. The same animal seems to have been called Aurochs by the Germans, and was the ancestor of the European domesticated cattle, and probably also of the wild cattle preserved at Chillingham and some other British parks. See Storer, *Wild Cattle of Great Britain* (1879).

Usagara, a territory in German East Africa, between Lake Tanganyika and the coast.

Usbegs. See UZBEGS.

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Usedom, an island of Prussia, lies at the mouth of the Oder, and together with the island of Wollin shuts off the Stettiner Haff from the Baltic. Area, 157 sq. m.; pop. 33,000. On its east side is the port of Swinemünde (q.v.), on the south-west side the town of Usedom (pop. 1786).

Uses, a form of equitable ownership peculiar to English law. Under the old law, if A and B were enfeoffed in land, to hold it to the use of C, A and B were legal owners, but C could bring them into a court of equity, and compel them to perform the trust. Uses were employed in various ways to evade the policy of the feudal law; parliament attacked the system more than once, and at last in 1536 the Statute of Uses provided that, where one held to the use of another, the person having the benefit of the use should also have the legal estate. The effect of this enactment was just the reverse of what parliament intended; uses were freely created, in order that the statute might operate upon them, and turn them into legal estates; equitable interests were created by the simple expedient of limiting a 'use upon a use.' Trusts (q.v.) of land and modern forms of conveyancing cannot be explained without reference to the old doctrine of uses.

See the works of Williams and Challis on *Real Property*. A clear account of the system is given in Bacon's famous *Reading on the Statute of Uses*.

Ushak. See CARPETS.

Ushant (Fr. *Ouessant*), an island off the west coast of France, included in the dept. of Finisterre, with an area of 20 sq. m. and a pop. (1891) of 2490. The coasts are escarped and difficult of access; the soil is fertile. The island has two lighthouses and a telegraph station. Off Ushant an indecisive sea-fight took place on 27th July 1778 (see KEPPEL); and here too on 'the glorious first of June' 1794 Howe (q.v.) gained a great victory, capturing seven vessels, one of which, the *Vengeur*, almost immediately went down with more than half her crew—in no glorious 'suicidal sinking,' in spite of Barère (q.v.).

Ushas, Hindu goddess of the Dawn. See VEDA.

Ushaw, 4 miles WNW. of Durham, the seat of St Cuthbert's Roman Catholic College, transferred hither in 1808 from Crook Hall. See DOUAY.

Usher (or USSHER), JAMES, in Dr Johnson's phrase 'the great luminary of the Irish church,' was born in Dublin, January 4, 1581. His father, Arland Usher, one of the clerks in Chancery, was a gentleman of good estate and family; his uncle, Henry Usher (*c.* 1550–1631), was his predecessor as Archbishop of Armagh. A brother of his mother's was that Richard Stanihurst who with his sister and father turned Roman Catholic, translated the first four books of the *Æneid* into English hexameters, and wrote the Description of Ireland for Holinshed's *Chronicles*. At thirteen Usher entered the newly-founded Trinity College, Dublin, being its second scholar and eighth fellow elected by merit. His father had intended him to study law, but his death in 1598 left the young scholar free to follow his natural bent. He first made over all the family property to his brother and sisters, only keeping enough for his support during his studies. The learned Catholic Thomas Stapelton's *Fortress of Faith* led him at twenty to the study of the Fathers, and their writings he read systematically every day for eighteen years. At nineteen he argued publicly with success against the Jesuit Henry Fitzsymons; in 1600 he took his Master's degree, and was chosen Catechist reader in his college; in 1601 he received both orders on the same day, and shortly after was appointed to preach at Christ Church on Sunday afternoons before the Lord Deputy. About 1603 he became Chancellor of St Patrick's, and in 1607 he was chosen professor of Divinity in Dublin, which office he held for thirteen years. He often visited England, and became an intimate friend of Camden, Selden, Bodley, Cotton, and Evelyn. In 1620 he was made Bishop of Meath, Privy-councillor for Ireland in 1623, and Archbishop of Armagh in 1625. He took part in 1634 in the convocation which drew up the canons of the Irish Church. He had Quarles as his secretary down to the outbreak of the Rebellion. Usher left Ireland for England in 1640, and it was on this journey that Wodrow tells us in his *Analecta* he paid a visit at Anwoth to Samuel Rutherford. During the Irish rebellion in that year all his property save his books was plundered. He continued to live in England, declined to sit in the Assembly of Divines at Westminster, and for about eight years was preacher at Lincoln's Inn. He was constant in his loyalty to the throne, yet was treated with more than indulgence by Cromwell. In his last years he lived with his son-in-law, Sir Timothy Tyrrell, at Cardiff, under the roof of the dowager Lady Stradling at St Donate, Glamorganshire, and of the dowager Countess of Peterborough, in whose house at Reigate in Surrey he died, 21st March 1656. Cromwell gave him a splendid burial in the Erasmus Chapel of Westminster Abbey, allowing the Church of England burial service to be used on that occasion alone.

Usher stands distinguished amongst the theologians of any age, not more by his vast learning and sagacity than by his charity, his sweetness of temper, and his humility. We are told that at the close of his long conferences with the learned Puritan Dr John Preston the good archbishop would say: 'Come, doctor, let us say something about Christ before we part'—a thoroughly characteristic story. He was Calvinistic in theology, and moderate and tolerant in his ideas of church government. As an *eirenicon* he proposed a modification of episcopacy which failed to commend itself to the zealots of either side—this was published by Dr Bernard in 1658 as *The Reduction of Episcopacy to the Form of the Synodical government in the Antient Church*. Of his numerous writings the greatest is the *Annales Veteris et Novi Testamenti* (2 vols. folio, 1650–54), which gave us the long accepted chronology of Scripture, the Creation being fixed at 4004 B.C., &c. As early as 1647 we find from the Stationers' Hall Registers that Fuller was labouring at an English translation of this work, which appeared in 1658 under Usher's own name only. Fuller acknowledges in his *Church History* that his 'wares' were from the 'storehouse of that reverend prelate—the Cape merchant of all learning.' He says further: 'Clean through this work, in point of chronology, I have with implicit faith followed his computation, setting my *watch* by his *dial*, knowing his dial to be set by the *sun*.'

Usher's *Discourse of the Religion anciently professed by the Irish and British* (1632) and *Britannicarum Ecclesiarum Antiquitates et Primordia* (1639) opened up new ground, giving in Gibbon's phrase 'all that learning can extract from the rubbish of the dark ages;' in his *SS. Polycarpi et Ignatii Epistolæ* (1644; cum appendice Ignatiana, 1647) he supported the authenticity of the Middle Form of the much contested letters of Ignatius (q.v.); the Calvinistic *Body of Divinity* (1645) was published without his consent, and part of it was denied to be his; his *De Græca Septuaginta Interpretum Versione Syntagma* (1655) was the first attempt at a real examination of the Septuagint. There is a complete edition of his writings by Professor Elrington and Dr J. H. Todd (17 vols. 1841–48–62–64); Lives by Nicholas Bernard (1656), Richard Parr (1686), and Elrington (in vol. i. of his edition). See also W. Ball Wright, *The Ussher Memoirs* (Dublin, 1889).

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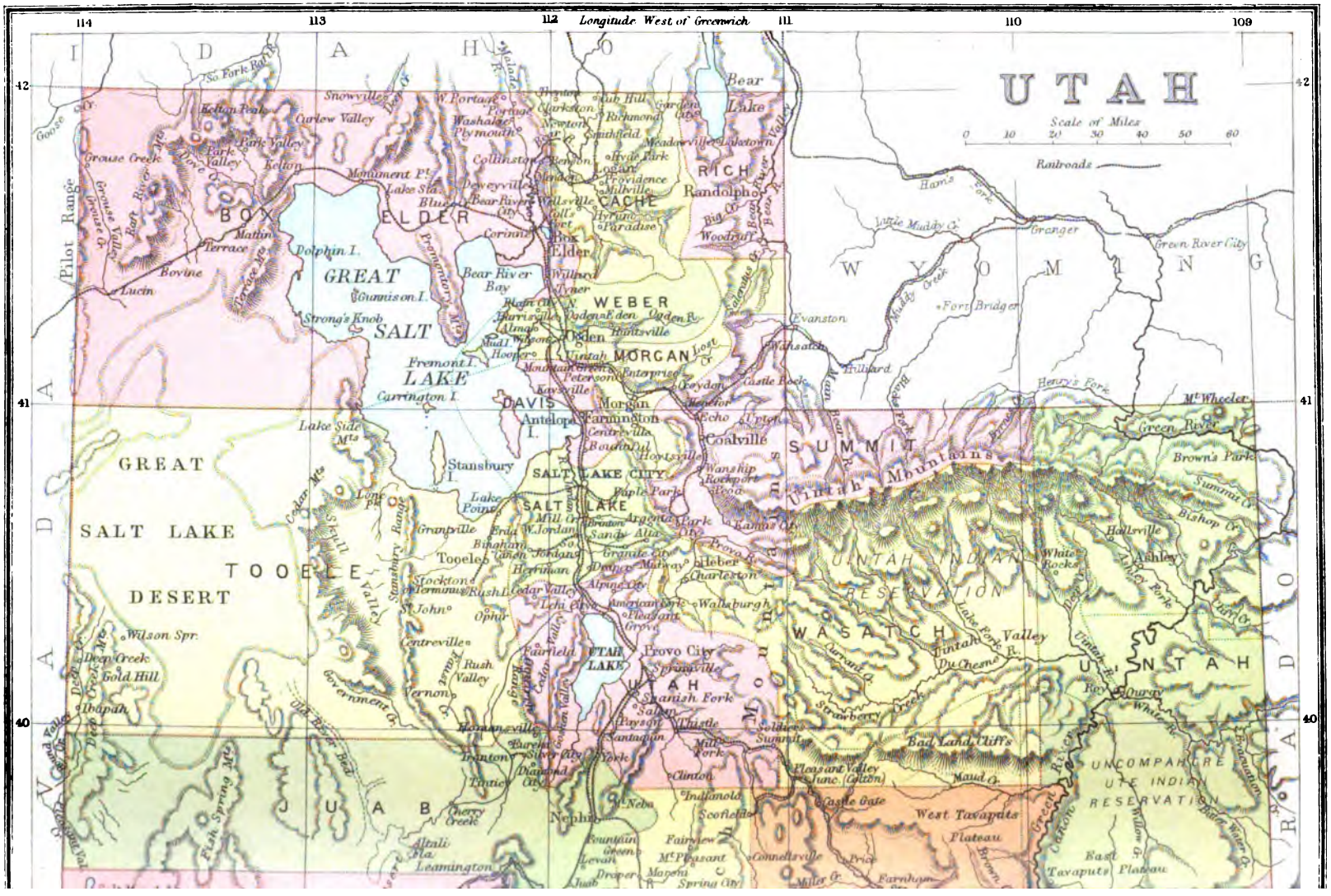
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Railroads
Longitude West of Greenwich
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IDAHO
WYOMING
COLORADO
Bear Lake
RICH
Randolph
CACHE
Logan
Providence
Millville
Hyde Park
Smithfield
Richmond
Clarkston
Newton
Plymouth
Washakie
Portage
W. Portage
Snowville
Curlew Valley
Park Valley
Kelton
Kelton Peak
Grouse Creek
Monument Pt.
Lake Sta.
Blue
Dewyville
Bear River City
Willville
Collinston
Corinne
BOX ELDER
Box Elder
Willard
Tremonton
Bear River Bay
Dolphin I.
Gunnison I.
Fremont I.
Carrington I.
Strong's Knob
Pilot Range
Bovine
Lucin
Terrace
Mattin
GREAT SALT LAKE
WEBER
Ogden
Harrisville
Pleasant View
Eden
Ogden R.
Huntsville
Almo
Wilson
Hooper
Mud I.
MORGAN
Morgan
Peterson
Mountain Green
Enterprise
Kaysville
DAVIS
Antelope I.
Farmington
Centerville
Bountiful
Lake Side Mts.
Stansbury I.
Stansbury Range
Cedar Mts.
Lone Pt.
Lake Point
SALT LAKE CITY
SALT LAKE
Mill Cr.
Granger
Erda
W. Jordan
Granville
Bingham
Tooele
Jordan
Herriman
Stockton
Terminus
Rush L.
Cedar Valley
St. John
Ophir
TOOELE
DESERT
Wilson Spr.
Deep Creek
Gold Hill
Ibapah
Centreville
Rush Valley
Vernon
Hamlin Valley
Government Cr.
Old River Bed
Hamlinville
Ireton
Eureka
Silver City
Diamond City
Tintic
Nephi
Cherry Creek
Fish Spring Mts.
Grand Valley
Desert Cr.
Deep Creek Mts.
JUAB
Altali
Ha. Leamington
Fountain Green
Levan
Mt. Pleasant
Draper
Juab
Maeni
Spring City
Sanpete R.
Sevier R.
Sevier Valley
Provo R.
Provo City
Springville
Spanish Fork
Salem
Payson
Santaquin
Mona
York
Clinton
Indianola
Scofield
Fairview
Connellsville
Price
Miller Cr.
Farnham
Castle Gate
West Tavaputs Plateau
East Tavaputs Plateau
Bad Land Cliff's
Pleasant Valley Junc. (Gilson)
Maud Cr.
Strawberry Creek
Duchesne R.
Uintah Valley
Lake Fork R.
Lake Fork Valley
Duchesne
Roy
Ouray
White R.
Evacuation Cr.
Willow Cr.
Cottonwood Cr.
Great Cr.
Green R.
UNCOMPAHGRE UTE INDIAN RESERVATION
UINTAH INDIAN RESERVATION
WASATCH
Uintah Mountains
SUMMIT
Coalville
Wanship
Rockport
Echo
Upton
Castle Rock
Weber R.
Hoytsville
Peoa
Park City
Kamas Cr.
Provo R.
Provo
Heber
Charleston
Midway
Deer Cr.
Alpine City
American Fork
Pleasant Grove
Lehi
Walsburgh
Timpanogos Cr.
Utah Lake
Goshen Valley
Evanston
Wahsatch
Hilliard
Fort Bridger
Muddy Creek
Little Muddy Cr.
Granger
Hams Fork
Green River City
Henry's Fork
Blacks Fork
Green River
Mt. Wheeler
Brown's Park
Summit Cr.
Bishop Cr.
Hallsville
Ashley
Ashley Cr.
Ashley Fork
Uinta Cr.
White Rocks
Big Cr.
Woodruff
Beaver R.
Bear R.
Logan R.
Cache Valley
Hyrum
Paradise
Wellsville
Mendon
Honeyville
Deweyville
Bear River
Blue Cr.
Lake Sta.
Monument Pt.
Grouse Creek
Park Valley
Kelton
Curlew Valley
Snowville
So. Fork Raft R.
Goose Cr.
Raft River Mts.
Raft River
Grouse Creek Mts.
Grouse Valley
Terrace Mts.
Pilot Range
Bovine
Lucin
Dolphin I.
Gunnison I.
Strong's Knob
Fremont I.
Carrington I.
Lake Side Mts.
Stansbury I.
Stansbury Range
Cedar Mts.
Lone Pt.
Lake Point
Granville
Tooele
Stockton
Terminus
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Wilson Spr.
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Grand Valley
Desert Cr.
Deep Creek Mts.
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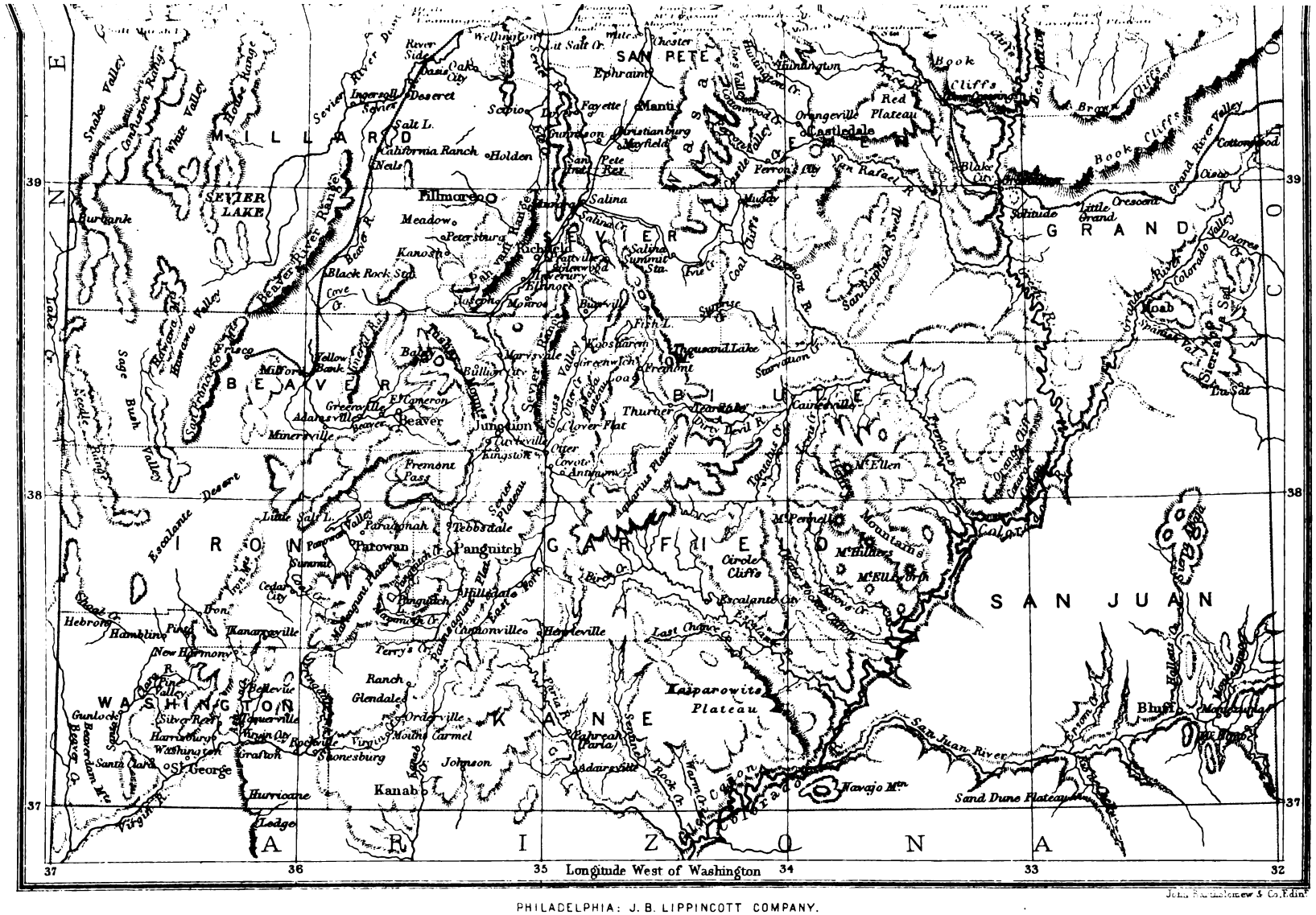
SAN PETE
MILLARD
SEVIER
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KANE
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IRON
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SAN JUAN
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Salina
Richfield
Monroe
Marysvale
Junction
Beaver
Minersville
Greenville
Meadow
Kanosh
Black Rock Sta.
Burbank
Deseret
Scipio
Manti
Ephraim
Mayfield
Sterling
Christiansburg
Huntington
Castledale
Orangeville
Red Plateau
Book Cliffs
Price
Wellington
Salt Lake City
Chester
Provo
Nephi
Levan
Juab
Holden
California Ranch
Neals
Salt L.
Sevier L.
Burrville
Koosharem
Fish L.
Thousand Lake
Circleville
Kingston
Antimony
Panguitch
Tebbs Dale
Paragonah
Parowan
Summit
Cedar City
Hillsdale
Hebron
Hamblin
Kanarraville
New Harmony
Pinto
Bellevue
Glendale
Orderville
Mount Carmel
Virgin City
Rockville
Grafton
Springdale
Johnson
Kanab
Hurricane
Ledge
St. George
Santa Clara
Gunlock
Silver Reef
Leeds
Harrisburg
Washington
Toquerville
Fremont Pass
Sevier Plateau
Aquarius Plateau
Thurber
Clear Creek
Fairview
Castle Dale
Ferron
Huntington
Emery
Green River
Woodside
Price
Wellington
Scofield
Helper
Wellington
Colton
Soldier Summit
Spanish Fork
Thistle
Nephi
Levan
Juab
Fillmore
Meadow
Kanosh
Salina
Gunnison
Manti
Ephraim
Mayfield
Sterling
Christiansburg
Huntington
Castledale
Orangeville
Red Plateau
Book Cliffs
Price
Wellington
Scofield
Helper
Colton
Soldier Summit
Spanish Fork
Thistle
Nephi
Levan
Juab
Holden

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Usk, a beautiful river of South Wales and Monmouthshire, rising at Talsarn, one of the Black Mountains, and winding 57 miles south-east, past Brecknock, Crickhowell, Abergavenny, Usk, Caerleon, and Newport, to the Bristol Channel. The town of Usk, 12 miles SW. of Monmouth, has a ruined castle, and with Monmouth and Newport returns one member. Pop. 1417.

Uskub, or SKOPLIE, a town of Turkey, on the Vardar, 130 miles NW. of Salonica by rail. It is the seat of a Greek archbishop. Uskub was once the residence of the Servian kings, and its pop. (29,000) is still largely Servian.

Usnea. See LICHENS.

Ussuri. See AMUR.

Ustilagineæ. See SMUT.

Ust Urt, the desert plateau between the Caspian and the Sea of Aral.

Usury now means iniquitous or illegal interest, but formerly meant interest of any kind on money lent. The Mosaic law forbade a Jew to take usury from a fellow-countryman. Greek and Roman moralists mainly disapproved of any usury; the church fathers, the popes, the canon law absolutely forbade it; hence the Jews had a kind of monopoly of usury at the Reformation. Luther condemned interest, while Calvin allowed it. A long series of laws were passed on the understanding that usury was wrong, but admitting many exceptions; the usury laws thus doing much harm and multiplying legal fictions. The moral question is still debated, and moralists such as Ruskin wax fierce against the taking of interest. But it may broadly be said that modern civilisation fully recognises the admissibility of fair interest. See INTEREST, PAWNBROKING.

Utah, a territory of the American Union, ranking tenth in area and fortieth in population among the forty-nine states and territories, is situated in the Rocky Mountain region. It is nearly rectangular in shape, extending from north to south 350 miles, and from east to west 280 miles, with an area of 84,970 sq. m. Idaho and Wyoming form the northern boundary; Colorado, the eastern; Arizona, the southern; and Nevada, the western.

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Utah lies in a great plateau region, having an average elevation of 5000 feet above the level of the sea. The Wahsatch Mountains, which extend nearly north and south throughout its entire length, and the Uintah Mountains, which are an eastern spur of and at right angles to the former range, divide the territory into two portions differing widely in topography and climate. The division lying to the north and west of these ranges belongs to the great interior basin of the continent, from which no water escapes except by evaporation. The eastern and southern sections form a part of the basin of the Colorado River, and are noted for their lofty and broken plateaus and deep cañons. The greatest elevation is attained in the Uintah range—nearly 14,000 feet. Mounts Nebo and Baldy, the highest points of the Wahsatch range, are about 12,000 feet high. In the basin region there are some lower and parallel ranges having a general north and south trend. The prevailing westerly winds are robbed of their moisture by the lofty peak of the Wahsatch range and the streams which flow from the mountains find their way toward the west, ultimately discharging their waters into Great Salt Lake, or into some of the smaller saline lakes or sinks of the desert. In the valleys lying among the lateral spurs along the western side of the Wahsatch range irrigation is not difficult. On the east, however, the towering plateaus which overhang stupendous cañons have but a slight and irregular rainfall, and except in a few favoured valleys agriculture is almost an impossibility. Portions of the Colorado basin are nevertheless, especially in the rainy season, well adapted for grazing. Even in the valleys along the western base of the mountains the success of irrigation varies in different years. The streams during the spring and summer are fed by the melting of the snow on the mountain summits. If the snow chances to fall early in the winter it becomes compact and the melting is retarded. A fall of snow late in the season lies loosely on the mountain sides, and the water reaches the valleys before the crops are ready to receive its full benefit. Much of the soil in the west is extremely fertile, but, as it lacks the necessary element of moisture on account of the insufficient altitude of the surrounding mountains, large areas of land seem destined to remain unproductive desert wastes. Great Salt Lake (q.v.), with its extraordinary percentage of saline matter in solution, is but the remnant of a vast body of fresh water which once covered western Utah.

Utah formed a part of the territory acquired by the United States from Mexico in 1848. The early growth and development of this region was in a great measure due to Brigham Young (see MORMONS). In 1850 a territorial government was organised, but Utah then included parts of Nevada, Wyoming, and Colorado. It was reduced to its present area in 1868. As polygamy was practised by the Mormons, and as they in various ways exhibited antagonism to the federal government, they became obnoxious to the 'Gentile' settlers. After various efforts at legislation their supremacy was finally overthrown, the Mormon Church corporation dissolved, and its property confiscated and set aside as a permanent school fund. The Mormons have renounced plural marriages, and show a tendency to abandon their former exclusiveness by affiliating themselves to the leading political parties.

The mineral resources of Utah are important. The annual product of copper, lead, silver, and gold is valued at more than $11,000,000. There is also a considerable output of coal. More than $4,500,000 are invested in manufacturing and industrial establishments, which are varied in character. Besides Salt Lake City, the important towns are Ogden, Provo, and Logan. Pop. (1870) 86,786; (1880) 143,963; (1890) 207,905.

See H. H. Bancroft's *History of Utah* (1888), and A. Lambourne's *Scenic Utah* (folio, New York, 1891).

Uterus. See WOMB.

Utica, an ancient city of North Africa 20 miles NW. of Carthage, originally founded as a Phœnician colony in 1101 B.C. Its ruins include an amphitheatre, an aqueduct, and the remains of quays; for a bay then carried the sea (now nearly 10 miles distant) to the site. During the third Punic war Utica submitted to Rome, and became the capital of the province of Africa. Afterwards it was the see of a bishop, till its destruction by the Arabs. Here the younger Cato (q.v.) killed himself.

Utica, a city of New York, 232 miles by rail NNW. of New York City. Regularly and substantially built, it rises in a gentle slope from the south bank of the Mohawk River, and is traversed by the Erie Canal. It contains a fine United States building, a city hall, state lunatic asylum, several hospitals, and a large and handsome Masonic Home and School (begun in 1891), is a noted market for cheese, and manufactures boots and shoes, cottons and woollens, organs and pianos, machinery, starch, &c. Pop. (1880) 33,914; (1890) 44,007.

Utilitarianism, the ethical theory which finds the basis of moral distinctions in the utility of

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actions—i.e. their fitness to produce happiness. This hedonistic theory, its genesis, and its various types are dealt with at ETHICS, Vol. IV. p. 435. The words utility and utilitarian in this sense were first used by Bentham about 1802; Mill, however, believed that he first employed in philosophy the term utilitarian (which he found in Galt's *Annals of the Parish*) in 1823. Utilitarian and utilitarianism are also used loosely in a much wider sense of the view of life which would regulate all effort and action with total disregard to what is merely noble or beautiful, to culture, grace, and artistic perfection, and would look for the universal test of aims and conduct in practical usefulness alone. 'Will it pay?' becomes then the first and the final problem for this degrading and impossible Philistinism, which is the negation of all poetry and art, of ideal morals or true religion. This is of course not necessarily involved in the acceptance of a hedonistic system of ethics. The utilitarian conception of education is a preliminary apprenticeship to the future trade or occupation in life; science or some branch of science may constitute an essential part of serious education, but literature (not to speak of the classics) should be but pastime for leisure hours. The contrasted ideals in this province are well shown in Herbert Spencer's *Education*, and Fouillée's *Education from a National Standpoint* (trans. 1892). See also BENTHAM, MILL, &c.

Utopia (Gr. *ou*, 'not,' and *topos*, 'a place,' equivalent to 'Nowhere'), the name given by Sir Thomas More (q.v.) to the imaginary island which he makes the scene of his famous political romance, *De Optimo Reipublicæ Statu, deque Nova Insula Utopia*, originally published in Latin at Louvain in 1516, and translated into English by Raphe Robynson (1551; 2d ed. 1556, reprinted by Professor Lumby 1880), as well as by Bishop Burnet in 1683. More represents this island as having been discovered by Raphael Hythloday, a companion of Amerigo Vespucci, but it of course is England, its capital Amaurote, London. Its laws and institutions are represented as described in one afternoon's talk at Antwerp, occupying the whole of the second book, to which, indeed, the first serves but as a framework. More's romance, or rather satire, obtained a wide popularity, and supplied (though incorrectly enough) the epithet *Utopian* to all impracticable schemes for the improvement of society.

Utraquists. See HUSS.

Utrecht (*Oude trecht*, 'old ford;' Lat. *Trajectum ad Rhenum*), the capital of a province of the Netherlands, on the 'Old' Rhine (q.v.), 23 miles SSE. of Amsterdam and 38 ENE. of Rotterdam. The walls were levelled in 1830, and formed into shady promenades, the present fortifications consisting of strong forts. St Martin's Cathedral, founded by St Willibrord about 720, and rebuilt in 1251–67, had its nave destroyed by a hurricane in 1674, so that the choir and the tower (321 feet high) now stand separate. The famous university, founded in 1634, numbers nearly 700 students, and has a library of 160,000 volumes. Other edifices are the 14th-century Roman Catholic cathedral, the town-hall (1830), the 'Pope's house' (built by Adrian VI., who was born here in 1459), the palace (in 1807) of Louis Bonaparte, &c. Utrecht since 1723 has been the headquarters of the Jansenists (see Vol. VI. p. 280). The manufactures include tobacco and cigars, woollen fabrics and carpets, salt, furniture, chemicals, machinery, &c. Pop. of the town (1869) 59,299; (1890) 86,116; and of the province (1890) 224,001, its area being 530 sq. m. Utrecht is one of the oldest cities of the Netherlands, and probably was founded by the Romans. Here the famed union of the northern provinces for the defence of political and religious freedom was formed, January 23, 1579 (see Vol. V. p. 742); and Utrecht is famous for the nine distinct treaties there concluded on April 11, 1713, which brought to a close the war of the Spanish succession (see Vol. IX. p. 779). By the treaty between France and Britain, the former ceded St Kitts, Hudson Bay, Nova Scotia, and Newfoundland (the liberty of fishing for cod being reserved), recognised formally the Hanoverian succession, engaged that the crowns of France and Spain should never be united, and that no part of the Spanish Netherlands should ever be ceded or transferred to France; whilst Spain renounced her Italian possessions in favour of Austria, and gave up Gibraltar and Minorca to Britain.

Utrecht, capital of the southernmost province of the Transvaal or South African Republic, 30 miles NE. of Newcastle in Natal. Pop. 4000.

Utrera, an old town of Spain, 19 miles by rail SE. of Seville. Pop. (1887) 15,010.

Utricularia. See INSECTIVOROUS PLANTS.

Uttoxeter (A.S. *Uttocceaster*), a market-town of Staffordshire, on an eminence above the Dove, 14 miles ENE. of Stafford. It has a modern church with an ancient tower and lofty spire, a town-hall (1855), a mechanics' institute, a free grammar-school (rebuilt 1859), and manufactures of iron, nails, ropes, beer, &c. Pop. 5000.

Uvula. See PALATE, DIGESTION.

Uxbridge, a market-town of Middlesex, on the Colne, 16 miles W. of London. It has one church, St Margaret's, restored 1872; another, St Andrew's (1865), with a spire of 170 feet; a town-hall (1836); and a spacious corn exchange (1861). Pop. (1851) 3236; (1891) 8206. Commissioners met here in January 1645 to discuss terms of peace between Charles I. and the parliament, but separated the month after without coming to any agreement. See Redford's *History of Uxbridge* (1818).

Uxmal, a ruined city in the north-west of Yucatan, 40 miles SW. of Merida, with vast remains of ancient grandeur, temple-terraces (see TEOCALLI) like those at Palenque (q.v.), &c.

Uzbegs, an important branch of the Turkish family of Tartars, who constitute the chief element in the native population in Khiva, Bokhara, Khokand, and some other parts of Turkestan. In some places their blood is mixed with a Tajik (or Aryan) strain; elsewhere, with Kiptchak, Kalmuck, and Kirghiz elements. Some are still nomads, but the most are settled in towns.

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V

the twenty-second letter of our alphabet, is a differentiated form of U. The two signs were at first merely the capital and the uncial forms of the same letter, which had two values, a vocalic and a consonantal. The uncial form, U, or u, has now been conveniently appropriated to denote the vowel, the capital form V being reserved for the consonantal sound. How this came about has already been explained in the article U, where the history of the symbol has been traced through the Greek *upsilon* and the Phœnician *vau* to the Egyptian hieroglyphic picture of an asp, which denoted *f*. The English sounds of *f* and *v* are closely related; they are both labio-dentals, formed by bringing the lower lip into contact with the upper teeth, *v* being the soft or voiced sound, and *f* the hard or unvoiced sound. This close relation of the sounds explains the derivation of one form from the other, and accounts for the fact that in the Anglo-Saxon alphabet there was no separate sign for *v*, the symbol *f* representing both sounds, as is indicated by the fact that in A.S. the Latin words *Virgilius* and *levisticum* were transliterated *Firgilius* and *lufestice*. It is believed that a medial *f* was pronounced as *v*, and an initial *f* as *f*. Thus in A.S. the words 'over,' 'heaven,' and 'five' are written *ofer*, *heofon*, and *fif*. The use of the symbol *v* to denote the voiced labio-dental is believed to be due to French influence, as it came in soon after the Norman conquest. Thus in the Peterborough MS. of the Saxon Chronicle, which was written before 1131, we find 'silver' and 'luve' (love) replacing the *seofor* and *lufe* of the earlier copies. In Latin the consonantal sound of *v* was that of our *w*, as is shown among other proofs by the name of the letter, which is *ve*. If the sound had been that of our *v*, which is a continuant, the name would have been *ev*, following the analogy of *ef*, *es*, and the other continuants. But the name *ve*, originally pronounced *we*, follows the analogy of *be*, *pe*, and the other explosives, and hence the sound must have been that of *w*, an explosive. The change from the explosive to the continuant sound must have taken place in France before the Frankish conquest, and from France it came to us. In Germany the symbol *v* normally retains the old value of *f*, our *v* sound being represented by *w*.

Vaal (Dutch, 'yellow;' its Hottentot name, Ky Gariep, has the same signification), a large river of South Africa, rises in the Drakenberg range, and flows west and south-west along the northern border of the Orange Free State, and through the northernmost portion of Cape Colony, to its junction, after a course of some 500 miles, with the Nu Gariep or Orange River.

Vaccination (inoculation with *vaccine*, the virus of cowpox; Lat. *vaccinus*, 'of a cow' is the pure cultivation of artificial cowpox (*vaccinia*) in the human system with the object of protecting from smallpox (*variola*). The practice was introduced by Jenner (q.v.) in 1796-98, and gradually made way in spite of the fierce opposition both of the medical profession and of the public. *Natural* cowpox is a vesicular disease of the teats and udders of milch-cows, and the vesicles contain lymph which has, when inoculated, the property of transmitting the same disease. Jenner thought that cowpox was derived from the ailment in horses' heels called Grease (see WEED), and Loy actually succeeded in producing vaccinia from this source. Ceely and Badcock produced vesicles by variolating cows (i.e. infecting them with smallpox), and Voigt, Simpson, Hime, and King claim to have succeeded, though Chauveau and Kline failed. There is no doubt protective vaccine material can be obtained from either natural cowpox, horsepox, or smallpox passed through the cow. Sir John Simon believes that cowpox is the smallpox of the cow, and this opinion appears to be justified by positive results. *Artificial* cowpox has been chiefly maintained since the time of Jenner by means of *humanised* lymph. The use of arm-to-arm instead of preserved lymph is essential to the success and efficacy of vaccination with humanised lymph. Ordinarily lymph can be taken from a vaccinated arm at the end of a week, and it should be carefully selected from the best formed vesicles upon the healthiest children. The Vaccination Acts of 1867, 1871, and 1874 made vaccination effectively compulsory in England, so that it is estimated about 95 per cent. are vaccinated. The registrar of the district must within a week of the registration of a birth deliver to the parent a 'notice of requirement' of vaccination of the child within three months of its birth in England and Ireland, and within six months in Scotland. In America vaccination is not compulsory, except indirectly, in most of the states of the Union, nor in Canada. It is in Victoria, Western Australia, and Tasmania, but not in New South Wales.

Calf-lymph.—Since 1880 the use of animal lymph has increased to an enormous extent; the use of this lymph is now obligatory in Berlin and in Saxony in public vaccination stations, and an establishment for the preparation of it exists in Berlin. Consequently there is now no active agitation against vaccination in Germany. Bovine lymph from spontaneous cowpox at Beaugency in France was introduced into the United States in 1870, and has almost entirely superseded humanised lymph. In Britain also animal vaccine has recently been found to be as manageable as humanised lymph, the station being at Lamb's Conduit Street in London. The lymph used was sent over to England in 1882 from Laforêt, near Bordeaux, from a calf vaccinated with material taken from a case of spontaneous or natural cowpox. Five calves are vaccinated every week in fifty or sixty places on the abdomen. The ordinary course run by the disease is that between three and four days after insertion of the lymph a line of inflammation appears, which on the fifth day is distinctly vesicular, and yields lymph. On the sixth day the vesicle is broader, and on the fourteenth or fifteenth day the crust is fully formed, and generally falls off about the end of the third week. The course of the vesicle is more rapid in the calf than in children, and the lymph is best on the fifth day. Part of the lymph is collected on points and sent up

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to the National Vaccine Establishment. A calf yields sufficient lymph for vaccinating 400 or 500 children, and more than 30,000 children have been vaccinated by Dr Cory from calf to arm since the station was started. The effects of lymph from the calf and of lymph from the infant are identical; he failed in twenty-two cases out of 5005 at the first trial, but succeeded the second time. Five vesicles are produced on each child, and the insertion success with calf-to-arm lymph is the same as that with human arm-to-arm vaccination, 96·7 per cent. Only about 1 per cent. of the cases were brought back for 'sore arms,' and these were mainly due to improper applications, plasters, &c. Out of 32,000 cases there were also thirty-eight cases of eczema and lichen, and sixteen of erysipelas.

Re-vaccination.—The claim first made on behalf of vaccination was that of equal immunity from smallpox as compared with the immunity resulting from 'inoculation,' without the danger of spreading infection. The protection was originally expected to last a lifetime, but now re-vaccination is thought advisable as early as ten years if in presence of smallpox. Re-vaccination, as a rule, gives protection for the remainder of life. Assuming that the State intends to compel complete insusceptibility, compulsory re-vaccination would be necessary. The impermanence of infantile vaccination has been ascribed to deterioration of the lymph in successive generations; but mere number of generations does not make it less effective any more than passing the contagion of smallpox through a great many generations diminishes its virulence. In 1887 in the smallpox hospitals of the Metropolitan Asylums Board out of 53,000 cases of smallpox treated 41,061 had been vaccinated. No case of smallpox has occurred during fifty years among nurses and attendants at smallpox hospitals who have been re-vaccinated before going on duty.

Protective Power of Vaccination.—The report (1884) of Sir George Buchanan shows the vast superiority as a protective against smallpox of public vaccination as compared with private vaccination, which is not supervised. Before vaccination was made compulsory, the smallpox mortality in England was double that of any other European state where it was compulsory, and 70 to 80 per cent. of the smallpox mortality in Great Britain and Ireland occurred under five years of age. Since the Vaccination Act of 1871 was passed, the smallpox mortality in the whole country has been greatly reduced, especially in the case of young children. The decennial reports for 1851–60 and 1861–70 show that the actual rates of smallpox mortality, at ages five and upwards, remained at a stand-still, and that the rates under five years had enormously decreased. Study of the London epidemics of 1876–78 and 1881–82 showed that the marked increase of smallpox at ages over five had really been the expression of an alteration in the behaviour of smallpox in this country. Statistics show that the fatality of smallpox varies (1) with the amount of vaccination possessed by the individual; (2) according to the age of those attacked; (3) according to the quality of the vaccination scars in those attacked. In addition to Mr Marson's well-known tables, Dr Gayton's report to the Metropolitan Asylums Board of 10,403 cases of smallpox shows the fatality per cent. of the attacks. He divides the scars according as they are 'good' or 'imperfect.' 'With four "good" scars there is an absolute immunity from death up to the age of fifteen, and with "good" scars, whether one, two, or three, there is an absolute immunity of death from smallpox up to the age of five.' When all the 'good' and 'imperfect' vaccinations are grouped together, it shows that from ten to fifteen and from fifteen to twenty years of age the 'good' vaccination afforded just three times the amount of protection against smallpox death that the 'imperfect' vaccination afforded. The protection against attack is of chief avail in the first few years after vaccination, and infantile vaccination cannot be relied on as lasting through adult life. According to Dr Gayton, whereas there was no death amongst those under five years who had 'good' vaccination, the percentage was 56·5 amongst the unvaccinated; from five to ten the corresponding figures were 9 and 35·2, from thirty to forty 9·5 and 40·7 per cent., and over forty 12·5 and 43. From Dr Barry's report on the Sheffield epidemic, it appears that the rate of attack among the vaccinated and unvaccinated of the population generally is one attack among the vaccinated under ten years of age for every twenty attacks among the unvaccinated; and over ten years one attack among the vaccinated for every five unvaccinated attacks. *In invaded houses*, irrespective of quality of vaccination, there were under ten years one vaccinated to eleven unvaccinated attacks; and over ten years one vaccinated to 2·4 unvaccinated attacks. In the children under ten years of age, where there was no visible mark, or one cicatrix only, 75·7 per cent. had discrete or mild attacks, and 24·3 confluent or severe attacks; where there were two cicatrices, the corresponding figures were 88 and 12; where three cicatrices, 95 and 5; where four or more cicatrices, 97·5 and 2·5. The fatality per cent. was shown to vary according to the amount of vaccination as shown by the cicatrices without reference to their quality. With increased number and better quality of the scars produced the severity and fatality of smallpox has decreased. Diminution in the amount of fatality and mortality corresponds with the nearness of the time to the vaccination at which the patient was attacked by smallpox. The greatest protection against attack is found near to the operation of primary vaccination or re-vaccination. The greater the remoteness from the date of vaccination, the greater has been the incidence of smallpox and the fatality upon those attacked. The safeguarding is essentially in the years immediately subsequent to vaccination, and the gain especially as regards infant life. Were this decline due to improved sanitation, we should naturally expect the fall to be shared by persons of all ages. During 1872–87 the fall in the general death-rate has been 9 per cent., and in other zymotic diseases 9 per cent. for measles and 1 per cent. for hooping-cough, as compared with 72 per cent. for smallpox. The fall in 'fever' mortality has been nearly as much, but it has been at all ages.

Objections to vaccination are made on the ground of alleged injurious effects resulting from the practice. Complaints of public vaccination in England and Wales in 1888 were only ten in number out of 689,323 children vaccinated. Inquiry by medical inspectors showed two of these cases to be measles and hooping-cough concurrent with vaccination, two to be skin eruptions following on vaccination, and the remainder to be cases of erysipelas or other similar disease. The Registrar-general reports that in from forty to fifty cases annually vaccination is mentioned among the causes of death, and from 1888 onwards all such cases were to be made the subject of careful investigation. Most of the accounts of 'vaccinal accidents' come from abroad. In 1883 certain cases of *erysipelas* followed the vaccination of soldiers at Dortrecnt, Holland, with humanised lymph received from a vaccination office. Seven men were attacked three days after the operation, and three died; but no official report of the cases has been published, and it is uncertain whether other cases of erysipelas were prevailing at the time. The risk of erysipelas

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is greatest during the second week. On the 30th December 1880 it is alleged that *syphilis* was communicated by vaccination to fifty-eight Zouaves in Algiers. The statement that two healthy children served as vaccinifers for 280 men, and that those fifty-eight men were operated on by lymph taken from one single child, is opposed to all experience in vaccination. Mr Ernest Hart says, 'during the twenty years in which there has been systematic inspection of public vaccination in England, some millions of vaccinations have been performed, but in no single instance have the government inspectors of vaccination been able, after the most rigid inquiry, to find one single case of syphilis after vaccination.' *Impetigo contagiosa*, which is caused by pediculi, has been attributed to vaccination at Elberfeld in 1887, and in the island of Rügen in 1885. Acute *septicæmia* followed a series of vaccinations in March 1885 at Asprières, Aveyron, France, and six children died. The lymph was taken from a vesicle which had been opened twenty-four hours previously, and had been contaminated. The preponderance of evidence goes to show that *leprosy* is not inoculable, but when it occurs is due to food, such as decayed fish; leprosy has declined in Norway and Sweden since vaccination was introduced.

Opponents of the practice have attempted to show not only that smallpox has not been reduced by vaccination, but that it has actually been increased; alleging that in France the greatest smallpox mortality occurred in the best vaccinated departments, and *vice versâ*. The returns were, however, shown to be very incomplete and unreliable. Körösi has shown that Dr Keller's statistics proving the uselessness and danger of vaccination were falsified (Int. Med. Cong. 1887). He has also shown that while the unvaccinated supply 87 per cent. of the deaths from smallpox, the percentage is less than 20 for all other diseases, so that smallpox is the only disease occurring in markedly greater proportion among the unvaccinated than the vaccinated.

Substitutes for Vaccination.—Improved *sanitation* has been credited with the decline in the prevalence and mortality from smallpox. Dr Creighton, however, thinks that sewerage, water-supply, and nuisance removal have little influence upon smallpox. The experience of the Sheffield epidemic showed that smallpox-hospitals should be removed outside populous places owing to danger of aerial spread. New South Wales has a system of compulsory notification with heavy fine for neglect, and power of isolating persons and things infected, or exposed to infection, for three weeks.

Bacteriological Cultivation.—The microbes of vaccinia have been carefully investigated with the view of producing an artificial lymph identical in potency with the standard material. So far, the effect of cultivation of lymph in media apart from the animal body, has been found to be the destruction of its specific power of producing a local vesicle.

For the history, various laws, and bibliography of vaccination, see Sir John Simon in the report of the Royal Commission for 1871; the 1st, 2d, and 3d reports of the Royal Commission for 1889-90, from which most of the preceding information has been gleaned; Seaton, *Handbook of Vaccination* (1868); Ballard, *Vaccination* (1868); Warlomont, *Manual of Animal Vaccination* (Eng. trans. 1885); *Vaccinia and Variola*, with bibliography, by the present writer (1887); and handbooks of the law by D. P. Fry (1875) and by a 'barrister-at-law' (1888); and the *Index Medicus*. *Vaccination and Smallpox*, by E. J. Edwardes (1892), is a plea for compulsory re-vaccination. Expressly in defence of vaccination are Ernest Hart, *The Truth about Vaccination* (1880), J. C. M'Vail, *Vaccination Vindicated* (1888), and Körösi (as above). Directly hostile are A. R. Wallace, *Vaccination Proved Useless and Dangerous* (1889); C. Creighton, *Jenner and Vaccination* (1888) and *The Natural History of Cow-pox and Syphilis* (1888); E. M. Crookshank, *History and Pathology of Vaccination* (1890); and the publications of the London Society for the Abolition of Compulsory Vaccination (founded 1887). The town of Leicester has taken a very prominent part in the anti-vaccination agitation. See also GERM, INOCULATION, JENNER, SMALLPOX; and for the analogous application of inoculation, HYDROPHOBIA.

Vacciniaceæ, an order of plants closely akin to Ericaceæ, and including the cranberry and whortleberry.

Vacuum literally means space empty of matter—i.e. empty of those ordinarily recognised realities whose properties are the objects of our perception. To empty a region once filled with matter is a practical impossibility. The Air-pump (q.v.) enables us to remove from the interior of a vessel a large fraction of the air originally contained therein. By other devices we may to a still greater degree reduce the quantity of gaseous matter filling the region; but even with the most efficient means we find it impossible to get rid of a last residuum. Thus the ideal vacuum is unattainable. The word, however, is used as applicable to the approximate realisation of this absolute emptiness, and the smaller the residuum left the higher is the vacuum said to be. Across such vacua light passes, and magnetic and electrostatic inductions take place with even greater ease than if the region were filled with air at ordinary pressure. Hence we conclude that a vacuum is after all a plenum, not of matter, in the ordinary acceptance of the term, but of some substance capable of transmitting energy. This substance we call the Ether (q.v.).

Besides the ordinary air-pump, there are several forms of apparatus useful for producing vacua. The most efficient of these are the various modifications of the Sprengel pump. In its simplest form the Sprengel pump consists of a long vertical glass tube of narrow bore, down which mercury is allowed to flow. The region to be exhausted is connected by an oblique tube with the vertical tube, at a point some 30 inches (the barometic height) above the lower end of the latter. As the mercury streams down the vertical tube the pressure at the place where the oblique tube enters tends to be less than the atmospheric pressure by an amount equal to the pressure of the mercury column from this place downwards. The air is therefore pressed out of the side tube and connected vessel into the vertical tube, and passes down with the mercury stream and escapes at the lower end. This process goes on until nearly all the air in the connected vessel has been carried away. It is convenient to measure the pressure of high vacua in millionths of atmospheres. With the most improved form of air-pump with valves and cylinders the highest vacuum attainable is 150 times the millionth of an atmosphere, whereas with an improved Sprengel pump it is possible to get a vacuum whose pressure is only 0·005 of the millionth of an atmosphere.

Vacuum-tubes, glass tubes in which a 'Vacuum' (q.v.) has been made and which have then been hermetically sealed, and into the opposite extremities of which platinum wires have been soldered, with an arrangement at the free ends of these whereby they may be connected with the secondary wires of an induction coil, or may, generally, be put into the circuit of an electric current (see ELECTRICITY). The object of this arrangement ('Geissler's tubes') is to pass a high-pressure current of electricity through the so-called vacuum, which is in reality a highly rarefied quantity of the particular gas (air, oxygen, nitrogen, &c.) with which the tube had been filled prior to exhaustion. When such a current passes, the residual gas glows with a bright light the colour of which varies with the nature of the gas in the tube, the glow being

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brighter round the negative electrode, but being separated from it by a thin dark layer. The discharge is repelled, attracted, or made to turn round a magnet brought near it in the same way as a perfectly flexible current-bearing conductor would be. If any fluorescent substances, such as a solution of sulphate of quinine, or uranium glass, be placed round the rarefied gas, these will glow brightly with their own fluorescence-colours, under the influence of the ultra-violet rays, in which the light of the discharge is rich. If a part of the tube be narrow the glow is broken up into discs or striæ, the cause of which is not clear. These striæ can in some cases be rendered less numerous and at a greater distance from one another by slowing the frequency of oscillatory discharge of each make-and-break of the induction coil. This can be done by interposing in the circuit a coil of numerous convolutions. The striæ are, however, observed when the current is apparently continuous, as when the source of electricity is a battery of 500 or more Daniell's cells. Gassiott inferred that the discharge of the battery itself through a rarefied gas is not continuous but intermittent. The number and position of the striæ is altered by altering the resistance in the circuit. If the discharge is rapidly and regularly intermittent the glow is sensitive to the approach of a conductor connected with the earth or a large condenser, and is repelled or attracted thereby according to the arrangement of the apparatus. It is not necessary that the platinum terminals should be in contact with the wires of an electric circuit; it is sufficient to put them to widely different potentials, as by lowering the tube into the electric field between the knobs of a Holtz machine: the residual gas then glows without contact. The same thing occurs when the field is one of high potential and rapid alternation. If the vacuum be reduced to $\frac{1}{100000}$th of an atmosphere the current will not pass and there is no glow. At about one-millionth of an atmosphere the molecules become so few that there are very few collisions between them. There is no light produced in the body of the gas unless these collisions occur. If the tube be less in its dimensions than the *mean free path* (see GAS) of the molecules the first collision of any given molecule leaving the negative electrode will probably be against the glass of the tube itself. The glass accordingly begins to glow with a bright phosphorescent light, but only at such points as can be reached by molecules leaving the negative electrode at right angles and travelling in straight lines. If the negative electrode be so formed as to concentrate the molecular impact upon a diamond it will shine with a green light equal to that of a candle; a ruby or aluminum oxide, bright red; glass, green. The position of the positive electrode appears to have no bearing on the phenomenon. Since the molecules travel in straight lines, any solid obstacle will cast a shadow, and the molecules exert mechanical force when they strike (see RADIOMETER); and they also produce heat which can, when they are concentrated upon a point, melt glass or even a piece of metallic iridio-platinum. The position of the glows is altered in such a way as to show that the moving molecules, electrically charged, are deflected when a magnet is brought near the stream. If there be two parallel streams from two negative electrodes, they, being similarly charged with electricity, repel one another. These are phenomena of *Radiant Matter* or the ultra-gaseous state (Crookes) in which the ordinary properties of gases (see GAS) are profoundly modified by the absence of collisions between the molecules. The reader will find an excellent account of the phenomena of vacuum-tubes, with numerous illustrations, in J. E. H. Gordon's *Physical Treatise on Electricity and Magnetism*, vol. ii.

Vagrants, a very numerous class of homeless persons roaming about the country, and from town to town, subsisting chiefly upon what they can beg or steal. In Great Britain it is reckoned that there are at least 60,000 vagrants. The nomadic life led by these waifs seems to possess a charm for them which proves irresistible, and they very rarely settle down to a regular occupation after they have been any length of time wandering. Vagrants have been known as a class for many centuries; and in almost every part of the world evidence has been obtained of the existence from remote times of wandering beggars whose mode of life bears striking resemblance to that of the vagrant of the present day. The Gypsies (q.v.), while having many of the same characteristics, do not usually associate with the ordinary vagrants, but belong to a class quite distinct and exclusive.

One of the most interesting and instructive records to be found concerning vagrancy is the *Liber Vagatorum, The Book of Vagabonds and Beggars*, edited by Martin Luther, and published in 1529 (Eng. trans. 1860). In it he gives a minute description of the various kinds of vagrants who were then known in the north of Europe, which may be condensed as follows:

(1) Beggars, or those who plainly and simply went about asking alms. (2) Bread-gatherers, who went about with their wives and children with them, dressed in ragged garments, collecting food, &c. These carried cooking utensils, &c. as a part of their equipment, and neither they nor their children ever left off begging from their infancy to the day of their death. (3) Liberated prisoners, who excused themselves for begging by saying they had been unjustly deprived of their liberty and character, and thus prevented from earning a different livelihood. (4) Cripples, many of whom shammed lameness or deformity. (5) Church mendicants, producing false credentials to show that they were collecting alms for religious purposes. (6) Learned beggars, young scholars or students, who said they had naught on earth but the alms wherewith people helped them, and which they would use in furthering their studies for the church or some of the professions. (7) Pretended murderers, who asserted that they had taken a man's life away, and had afterwards been seized by remorse, though it was in self-defence, and that this had driven them to a wandering life. (8) Wives of the above. (9) Lepers, or those suffering from loathsome diseases. (10) Spurious beggars, who pretended that like the Capuchin friars they were voluntarily poor. (11) Pretended noblemen and knights, who travelled about well dressed, saying that they had suffered by war, fire, or captivity, or had been driven away and lost all they had. (12) Pretended merchants, who produced documents to show that they had been possessed of merchandise which they had lost. (13) Baptised Jewesses who had turned Christians. (14) Pretended pilgrims. (15) Beggars suffering with sores. (16) Strollers professing to country-people that they were possessed of magic power, and could prevent murrain, &c. (17) Knaves with falling sickness, who took fits and assumed sudden illness. (18) Invalids alleging that they had suffered for years with incurable ailments, or whose wives or families were alleged to be so afflicted. (19) False begging priests. (20) Blind beggars. (21) Naked beggars, whose apparel was so very scanty as to arouse universal pity. (22) Silly or half-witted beggars, who, while apparently bereft of some of their mental faculties, were generally 'more knave than fool.' (23) Hangmen, who had given over their hateful avocation. (24) Women so clothed as to lead to the

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belief that they were pregnant. (25) Mendicants who besmeared themselves with a yellow fluid to simulate jaundice. (26) Vagrants professing to be doing penance. (27) Blind harpers. (28) Goose-shearers, or those who put on good clothes and begged, saying that they had lain ill a long time, and were mechanics who had expended all their goods, and were ashamed to beg, but asked that they might be helped to proceed on their journey.

If one makes allowance for the changes which have taken place in the manners and customs of the people and in their modes of living, the similarity which exists between the modern vagrant and many of those described by Luther is apparent. Perhaps the most crafty of the vagrant class of the present time are to be found among the begging-letter impostors whose carefully worded epistles so often succeed in extracting contributions from the charitable. The cause assigned for these appeals is generally the death of a wife, husband, or child, or the distress which has been caused by accident or illness. The begging-letter writer generally carries on the business in such a manner as to make sure that, by the time the local police have been communicated with, the gains have been secured, and a new field of operations has been found in a distant part of the country. A considerable number of 'Indian natives' are to be found in Great Britain and over the continent of Europe who may be classed as vagrants. They go from place to place, dressed in their native costume, and subsist on the profits of small articles which they sell at street corners, and by exhibiting a printed card hung round the neck. The dress they wear, their dusky skins, and their want of knowledge of the language of the country in which they are found, form sufficient capital to enable them to live in comparative comfort, and in numerous cases even to set aside enough for their wants in old age. Representatives of this class are constantly to be found in all the large cities in the United Kingdom. Many other kinds of vagrants might be described, the most numerous amongst those not included in Luther's list being the 'Patterers' or street singers, or speech-makers, to be found in almost every country. Luther's list, however, embraces most of the vagrants of the present day. There are still the same freemasonry, slang, nicknames, and practices which formed so striking characteristics of the vagrants in the olden time. The introduction of mechanical labour, the facilities of communication between places at a distance, and the operations of the poor-laws have, however, brought about great changes among the wanderers, and the ranks of the vagrants have been swelled, especially during the last half-century, by a vast number of unsteady and unskilful workmen and labourers who are continually travelling from town to town 'in search of work.' Many of these degenerate from the 'tramp' into the habitual vagrant, whose habits they become daily familiar with. The habitual vagrant is known to the tramp as a 'moucher,' while the tramp is known as a 'traveller.' The 'common lodging-houses' to be found in all large cities are the meeting places where the 'traveller' and the 'moucher' foregather, and there is too much reason for believing that the constant recital of experiences in begging, &c. to irresolute and unsteady tradesmen is gradually increasing the enormous army of vagrants by which the country is overrun. These 'common lodging-houses' are known to their frequenters as 'doss-kens,' and those of them resorted to by juveniles as 'padding-kens.' In them the plans of operation and different routes to be followed by the begging and thieving fraternity are generally arranged, and the chances of different neighbourhoods discussed. In many of them will be found rough maps or charts showing the various roads, the houses on the way, and the chances of success which each provides. If no map or chart is to be found, there is generally no lack

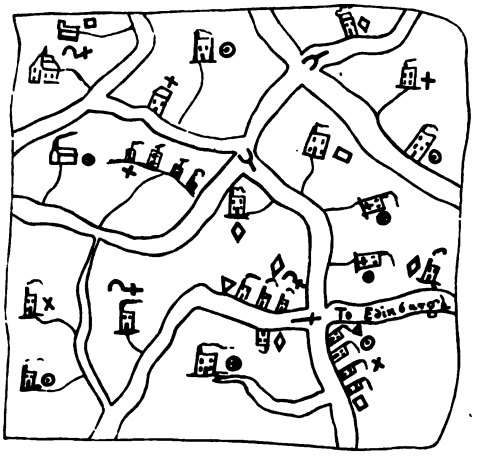

Fig. 1.—Specimen of a Moucher's Map:

- Go in this direction; the other road not good.
- Spoiled; too many vagrants call.
- Dangerous; likely to be given in charge.
- Too poor; give nothing.
- Good; safe for something if you don't talk much.
- Religious but kind.
- Stop. If you are selling what they happen to want, they'll buy; they are cute.
- Mind the dog; may give you in charge.
- Cross sticks put by Gypsies and tramps at the junction of roads to show in which direction their friends have gone before them; the long limb pointing the way.

of means of information in the persons of old members of the fraternity, who in accordance with their traditions are bound to furnish their brethren with all the assistance they can in the pursuit of their calling.

Great improvements have been made of recent years in the construction of these lodging-houses, especially regarding the sleeping accommodation, and many of the most objectionable features of the old 'doss-ken' or 'padding-ken' have been removed. More regard is paid to decency, and in

Fig. 2.—Four Sleeping Bunks in 'Castle' Common Lodging-house, Grassmarket, Edinburgh.

many of those of the best class each of the inmates is by an ingenious economising of space provided with a private apartment for sleeping. The bunks are arranged in rows in large apartments; fig. 2

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shows part of one of the rows. The beds AA, BB, shown by the dotted lines, are one above the other, and have access from separate doors. In the figure Nos. 163 and 165 have the upper beds AA, and 164, 166 the lower, BB. The top of the structure being several feet from the ceiling ensures ventilation. The beds are 6 feet by 28 inches. Although separate sleeping quarters are now provided, the kitchen is still, however, an apartment in all common lodging-houses where the inmates meet together. In it the vagrants discuss their plans of operation each night, and arrange their 'work' for the following day, so as to interfere as little as possible with each other's 'business,' and their respective 'walks' are assigned with as much deliberation and care as if they were conducting legitimate trade.

Statutes for the suppression of vagrancy have been in force for many years, the principal measures in existence in England being 5 Geo. III. chap. 83, 1 and 2 Vict. chap. 38, and the Vagrant Act Amendment Act of 1873. These acts cannot be said to have materially affected the growth in numbers of the vagrant class, while it is to be feared that in many places the existing arrangements under the poor-laws have given direct and material support to vagrancy. The 'casual wards' which have been provided have been largely used by the 'mouchers,' who have thus been relieved of any anxiety they formerly had as to being able to secure sleeping quarters and a morning's meal. The shelter and society which the casual ward provided were found to act so powerfully in attracting the vagrant class that various methods had to be adopted for counteracting these influences. Tasks of work were exacted, and relief was refused to all able-bodied young men unless they produced certificates of character from some person in a public position, or unless the workhouse officials were satisfied they were actually destitute. These rules, however, are now only partially enforced, although in some places the task of work is still carried out, and in others admission is only given to the casual ward on the production of a pass from the police. Great difficulty is experienced in discriminating between genuine workmen travelling in search of work and idle, habitual tramps. Where the police have been employed as relieving officers this difficulty has been best overcome, and it is generally believed that if this course were universally followed a great improvement would be effected, and many of the inducements held out to vagrants by the present system would be removed. Experience in some parts of the United States, where the slang and the hieroglyphics of the tramps are practically identical with those of the English fraternity, proves that, while proper regard has been had to the difficulties of the genuine working-man on tramp, a firm administration of the law by the infliction of exemplary sentences upon habitual vagrants has had quite a phenomenal effect in reducing the number of that class.

See John Awdelay, *The Fraternitye of Vacabondes* (1565; ed. by Furnivall, 1869 and 1880); Thomas Harman, *Caueat for Vagabones* (1568); H. Mayhew, *London Labour and the London Poor* (4 vols. 1851-61); Avé-Lallemant, *Das Deutsche Gaunertum* (4 vols. Leip. 1858-62); C. J. Ribton Turner, *History of Vagrants and Vagrancy* (1887); and the articles SLANG, SHELTA, POOR-LAWS, and HAWKERS.

Vaigatch. See NOVA ZEMBLA.

Vaiseshika. See SANSKRIT, Vol. IX. p. 153.

Vaishnavas, the sects worshipping Vishnu (q.v.). See also INDIA, p. 106; SANSKRIT, p. 153.

Valais (Ger. *Wallis*), a frontier canton of Switzerland (q.v.), bounded on the N. by the cantons of Vaud and Bern, and on the S. by Italy. Area, 2036 sq. m.; pop. (1888) 101,837. It forms one long and deep valley, included between two of the loftiest mountain-chains of Europe—the Pennine and the Bernese Alps—and is drained by the Upper Rhone, which, rising at its north-eastern extremity, falls at the western boundary of the canton into the Lake of Geneva. The greater part of the surface consists of barren mountain-slopes—in their higher elevations covered with the greatest of the Swiss glaciers. The forests and pasture-lands supply the inhabitants with their chief occupations. The heat at the bottom of the valley, where there is a strip of corn-land, is intense in summer, and Indian corn and the vine are grown with great success. The Grimsel and Gemmi passes connect the eastern part of the valley with German Switzerland; and the Great St Bernard and Simplon (q.v.) passes connect it with Italy. Sion (q.v.) and Martigny (q.v.) are the chief towns.

Valckenaer, LODEWYK KASPAR, an eminent Dutch philologist, born at Leeuwarden, June 7, 1715, studied at Franeker and Leyden, and in 1741 became professor of Greek at Franeker, in 1766 successor to Hemsterhuis at Leyden, where he died, March 14, 1785. His works included editions of the Greek grammarian Ammonius (1739), the *Phœnissæ* (1755) and *Hippolytus* of Euripides (1768), the so-called *Epistles of Phalaris* (1777), Theocritus, Bion, and Moschus (1779–81), and posthumously the *Fragmenta* of Callimachus (1799).

Valdenses. See WALDENSES.

Valdepeñas, a town of Spain, in the province of Cindad Real, 140 miles by rail S. by E. of Madrid. The district is celebrated for its red wine. Pop. (1887) 15,404.

Val de Travers, a valley in the Swiss canton of Neuchâtel. Near the villages of Travers and Couvet, both on the line of rail from Neuchâtel to Pontarlier, are great asphalt-mines (see ASPHALT), the stratum being over 18 feet thick.

Valdez, or VALDES, JUAN DE, Spanish reformer (1500–44), became an object of suspicion to the Inquisition by a politico-religious tractate or 'Dialogue between Mercury and Charon,' and settled in Italy, living the rest of his life at Naples. He was the centre of an influential circle of religious thinkers, including Ochino; though regarded as a heretic, he sought the regeneration of the Catholic Church from within, and never inclined to Lutheranism.

Among his works are *Spiritual Milk, The Christian Alphabet, CX. Considerations and Commentaries on Matthew, Romans, and 1st Corinthians,* some extant in the original Spanish, some only in Italian translations. The four last-mentioned works have been translated into English (1865-83). See monographs by Stern (Strasb. 1869) and Carrasco (Geneva, 1880), M'Crie's *Reformation in Italy,* and Wiffen's life prefixed to his translation of the *Considerations* (1865).

Valdivia, capital of one of the southern provinces (area, 8315 sq. m.; pop. 70,000) of Chili, on the navigable Callecalle, 15 miles above its mouth in Valdivia Bay. It has a considerable import trade. Pop. 6000.

Valence, capital of the French dept. of Drôme, is on the left bank of the Rhone (crossed by an iron bridge), below the mouth of the Isère, and 66 miles by rail S. of Lyons. It contains several interesting Renaissance buildings, an 11th-century cathedral (with a monument of Pius VI., who died here in 1799), an 18th-century Protestant temple, normal schools, a communal college, &c. Dyeing and the manufacture of silk, glass, and iron are carried on, besides a busy trade in the produce of the Isère valley. Pop. (1891) 22,947.

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Valencia, (1) a seaport of Spain, formerly capital of the kingdom, and now of the province of the same name, stands on the shores of the Mediterranean, 3 miles from the mouth of the Guadalaviar and 200 miles SW. of Barcelona by rail. In the *Huerta* ('garden') surrounding the city the carob, citron, orange, palm, and mulberry grow in wild luxuriance. The old picturesque battlemented walls, erected by Pedro IV. in 1356, were removed in 1871; and while, in the old quarters, the houses are closely packed and gloomy-looking, well suited to keep out the heat, those recently erected are gaily-coloured and furnished with courts freshened with flowers and cooled by fountains. Valencia is the see of an archbishop, and its cathedral, which was commenced in 1262, classical in the interior, and Gothic on the exterior, is 350 feet long. The church of the Colegio de Corpus is quite a museum of pictures by Ribalta. The picture-gallery contains chiefly the productions of the Valencian school (Juanes, the Ribaltas, Ribera, &c.). The university has a library of 42,000 vols. The custom-house, dating from 1758, is now a cigar-factory. Silk-spinning and weaving are extensively carried on; there are also manufactures of cloths, hats, glass, linen, leather, cigars, and Valencia tiles for flooring. The exports are mainly grain, silk, rice, and fruits. Pop. (1877) 143,856; (1887) 170,763.—Valencia, or *Valentia del Cid*, dating from the second century B.C., was destroyed by Pompey, taken by the Goths in 413 A.D., by the Moors in 715, and by the Cid in 1094. The union of Ferdinand and Isabella brought it under the Castilian crown. Suchet captured the city in 1812.—The old kingdom of Valencia, now subdivided into the three modern provinces of Valencia, Alicante, and Castellon de la Plana, comprises a tract of country in the east of Spain, washed by the Mediterranean, and extending from Catalonia to Murcia. It has a hot but fine climate, a fertile soil, mineral wealth, and many industries; see SPAIN.—(2) *Valencia de Alcántara*, a town and fortress of Cáceres province, is the frontier station on the line from Madrid (250 miles ENE.) to Lisbon (159 miles WSW.). Pop. (1887) 8230.

Valencia, a city of Venezuela, capital of Carabobo state, lies close to the beautiful banks of the Lake of Tacarigua, 34 miles by rail S. of Puerto Cabello. It has a college, a normal and a technical school, several parks, and manufactories of woollens, machinery, and agricultural implements. Pop. (1888) 38,654.

Valenciennes, a dark, ill-built manufacturing town and first-class fortress of France, in the dept. of Nord, stands at the entrance of the Rhonelle into the Scheldt (which flows through the town in several arms), by rail 155 miles NNE. of Paris and 58 SW. of Brussels. It possesses a citadel constructed by Vauban, an hotel-de-ville with decorated façade, and a modern Gothic church of Notre Dame with tower 272 feet high. The famous Lace (q.v.) is no longer made here, but a coarse sort is manufactured. Other manufactures are a fine cambric, cotton yarn, hosiery, linseed-oil, beet-root sugar; and the town contains extensive ironworks. The country round about is a great coal-basin, with numerous pits. Valenciennes (the *Valentinianæ* or *Valentiana* of the Romans) was ceded to France in 1678, and was taken by the Allies in 1793, after a siege of 84 days, but restored again next year. It is the birthplace of Watteau and Froissart (statue, 1856). Pop. (1872) 22,118; (1891) 24,520.

Valency. See ATOMIC THEORY.

Valens, emperor of the East from 364 to 378, and brother of Valentinian I., was born near Cibalis in Pannonia about 328, and at thirty-six was chosen by his brother as his associate in the empire. He first crushed the formidable revolt of Procopius, next reduced all taxes by one-fourth. Incapable in all things of independent judgment, Valens adopted the views of his Arian councillors, and persecuted the orthodox. After some fighting with the Goths, he concluded a six years' truce with them, the Danube being agreed upon as the frontier. The years 371–377 he spent in Asia Minor, chiefly at Antioch, and conducted with as little vigour as success an indecisive war with Sapor (Shappur II.), king of Persia, closed by a discreditable truce in 376. The prophecy of some fortune-tellers that his successor should be one whose name began with *Theod* led to the death of their young dupe Theodorus as well as many innocent men who bore names with the unlucky prefix, and to a severe persecution of those who practised magic and necromancy. About 376 the Huns began to press upon the Goths, who craved permission to cross the Danube. Valens allowed them to cross, but the terms of treaty were not kept, and the Goths, under their chief Frithigern, were quickly changed to enemies by the imperial mismanagement and faithlessness. They burned and ravaged the country, and, though driven back for a time, returned reinforced by Huns and Alans, and met the emperor in battle near Adrianople, August 9, 378. The imperial army was totally routed, and two-thirds of it, including Valens himself, left dead on the field. His successor was Theodosius.

See Gibbon's *Decline and Fall*, and Hodgkin's *Italy and her Invaders*.

Valentia, or VALENCIA, a small island off County Kerry, 5 miles long by 2 broad. In some parts fairly good in soil, it has much rocky moorland, and cliffs nearly 900 feet high at the north end. The islet is chiefly notable as the European terminus of more than one Atlantic Telegraph (q.v.). The name, long held to prove that a colony from Valencia in Spain had settled here, is most likely corrupted from the Irish *Val-inch* or *Fail-inis*.

Valentine, BASIL, a celebrated German alchemist, counted also as the father of analytical chemistry, who flourished most probably about the end of the 15th century. The name is obviously a pseudonym framed to imply his occult mastery over the metals (*Basilius*, 'royal;' *Valentinus*, from *valeo*). He appears to have journeyed to England and Holland, and to have lived as a Benedictine monk in St Peter's convent at Erfurt (see ALCHEMY). The titles of Basil Valentine's works will be found in Lenglet du Fresnoy's *Histoire de la Philosophie Hermétique* (vol. iii. 1742).

Valentine's Day, the 14th of February, on which, in England and Scotland in former times, each young bachelor and maid received by lot one of the opposite sex as 'valentine' for the year. It was a kind of mock betrothal, and was marked by the giving of presents. From Pepys's *Diary* we see that married as well as single people could be chosen. The usage no doubt grew out of the old notion, alluded to by Chaucer and Shakespeare, that on this day birds first choose their mates. The observance of St Valentine's day degenerated into the usage of youths and maidens sending each other by post prints of a sentimental kind, such as Cupids, transfixed hearts, and the like. Another and less pardonable form is the sending of ludicrous caricatures, often vulgar enough; but such boorish witticisms are fast dying out. Several saints of this name (one of them a martyr at Rome under Claudius) were venerated on February 14; but the observances seem to be connected rather with the spring-time than with the career or character of the saints whose name is thus taken in vain.

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Valentinian, Roman emperor (364–375), was born of humble family at Cibalis in Pannonia, 321 A.D. By his capacity and courage he rose rapidly in rank under Constantius and Julian, and on the death of Jovian was chosen as his successor (February 26, 364). He resigned the East to his brother Valens, and himself governed the West with watchful care down to his sudden death at Bregetio, November 17, 375, brought on by a fit of passion. By his first wife he had one son, Gratianus (q.v.), and by the second, Justina, another son, Valentinian II., and three daughters, one of whom, Galla, became the wife of the Emperor Theodosius I.—VALENTINIAN II. was born in 372 A.D., and received from his elder brother, Gratianus, the provinces of Italy, Illyricum, and Africa, as his share of the western empire. During his long minority the empress Justina administered the government; and about three years after her death Valentinian was murdered by Arbogastes, the commander-in-chief of his army (392).—VALENTINIAN III., the grand-nephew of the preceding, being the son of Constantius III. by Placidia, the daughter of Theodosius the Great and Galla, was born about 419 A.D., and was seated on the throne of the West by Theodosius II., emperor of the East, in 425. Valentinian was a weak and contemptible prince, and never really ruled during the thirty years that he sat disesteemed and unhonoured on the imperial throne; his mother, Placidia, governed till her death in 450, and was succeeded by the eunuch, Heraclius, one of those malignant fribbles who swarmed around the throne of the falling empire. His treatment of Bonifacius made the latter throw himself into the arms of Genseric (q.v.), chief of the Vandals, and thus lost Africa to the empire. Aëtius, the buttress of his empire, he stabbed to death in a fit of envious jealousy (454), but next year was himself slain by Maximus, whose wife he had ravished.

Valentinians, a Gnostic sect founded by Valentinus, who went from Alexandria to Rome about 140 A.D., and died there, or in Cyprus, about 160. The distinguishing feature of his system lies, in the first place, in his recognising heathenism as a preparatory stage of Christianity; and then in his dividing the higher spiritual world into fifteen pairs of æons, each consisting of a male and a female. The first pair, or syzygy, is made up of the unfathomable profundity Bythos, or God in Himself, and Ennoia, or God as existing in His own thoughts; from these emanated next Nous ('mind') and Aletheia ('truth'), Logos ('word') and Zoe ('life'), Anthropos ('man') and Ecclesia ('church'). As the last æon, Sophia ('wisdom'), transgressed the bounds that had been laid down by the æon Heros, and a part of her being became lost in Chaos, there was formed a crude being, called Achamoth (Heb. *chochmah*, 'wisdom'), which, through the Demiurgos that emanated from it, created the corporeal world. Heros now imparted to the souls of men a *pneumatic* or spiritual element, but this only attained to full activity when Christ, a collective emanation from all the æons, appeared as Saviour, and united Himself with the man Jesus. In the end all that is pneumatic, and even the originally psychic or soul element in as far as it has assimilated itself to the psychic, will return into the Pleroma. The chief Valentinians were Heracleon of Alexandria, Ptolemy, and Marcus of Palestine. See GNOSTICISM, and Lipsius, *Valentinus und seine Schule*, in the *Jahrbücher für Prot. Theologie* (1887).

Valenza (*Valentia*, or *Forum Fulvii*), a town of Northern Italy, on the Po, 9 miles by rail N. of Alessandria. Pop. 6466.

Valera. DON JUAN VALERA Y ALCALÁ-GALIANO, Spanish writer and politician, was born of good family at Cabra (Cordova), 18th October 1824, and in the diplomatic service lived successively at Naples, Lisbon, Rio, Dresden, and St Petersburg. He next plunged into politics, contributing actively to Albarada's opposition journal, *El Contemporaneo*, and thereafter rose and fell with the fortunes of his party, as deputy, minister of commerce, plenipotentiary to Frankfort, minister of public instruction, ambassador at Lisbon, Washington, Brussels, councillor of state, senator, and member of the Spanish Academy in Madrid. His *Estudios críticos sobre literatura* (1864) and *Disertaciones y juicios literarios* (1882) brought him reputation; but his fame depends on his romances, *Pepita Jiménez* (1874; Eng. trans. 1891), *Las ilusiones del Doctor Faustino* (1876), *El Comendador Mendoza* (1877), and *Doña Luz* (1878). Besides these he has published poems (1858), Dramatic Experiments (1878), short stories (1882), and *Cartas Americanas* (1889).

Valerian (*Valeriana*), a genus of plants of the natural order Valerianaceæ, an order of exogenous plants, containing nine genera and about 300 known species, natives of temperate climates, chiefly of Europe, the mountainous parts of India, and South America; annual or perennial herbs, sub-shrubs or rarely shrubs, with opposite leaves, destitute of stipules, and small flowers in cymes. They are nearly allied to Dipsacaceæ (see TEASEL) and Compositæ, but differ in the mode of inflorescence, and in the seeds being destitute of albumen and other intrinsic features. The genus Valeriana is distinguished by a pappus-like calyx, a spurless corolla, and three stamens. The species are pretty numerous. The common Valerian (*V. officinalis*) is abundant in ditches, moist woods, &c. in Britain, throughout Europe, and in northern Asia, and is cultivated in the United States. It has a fleshy root, pinnatifid leaves, a stem 2 to 4 feet high, and pale flesh-coloured flowers. The root is a well-known medicine, which possesses powerful antispasmodic and stimulant properties, and a very considerable influence over the nervous system (being used in hysteria, chorea, &c.). Cats are very fond of it, and it exercises a remarkable stimulating and intoxicating power over them. Although the plant grows chiefly in damp soils, the root is most powerfully medicinal in dry hilly ground. The chief ingredients of valerian are woody fibre, resinous and gum-like matters, and a little more than 1 per cent. of a volatile oil, in which *valerianic* or *valeric* acid (also obtained from several other sources) is developed on exposure to the air. Some of the salts of valerianic acid act with more certainty than the tincture and other officinal preparations.

Valeriana officinalis.

The Small Marsh Valerian (*V. dioica*) is much less powerful than the common species. The Greater Valerian (*V. Phu*) grows in alpine districts of the continent of Europe, and is perhaps the *V. dioscoridis* of the Greeks. *V. celtica* and *V. salinuca*, gathered on the mountains of Styria and

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Carinthia, are used in India to aromatise baths, and as a substitute for Spikenard (q.v.). *V. sitchensis*, a native of the north-west of America, possesses the medicinal properties of the genus. The root of *V. edulis*, a species found in the north-west of America, was an article of food with the Digger Indians. Corn Salad (q.v.) or Lamb's Lettuce belongs to the order Valerianaceæ; and Red Valerian is *Centranthus ruber*.

Valerianus, P. LICINIUS, Roman emperor (253–260), was proclaimed emperor by the legions in Rhætia after the murder of Gallus. He was then about sixty, and he assumed as colleague his eldest son Gallienus (q.v.). Throughout his reign trouble hovered on every frontier of the empire, but as the East appeared most threatening Valerian set out at the head of an army, and was suddenly attacked and completely defeated at Edessa (260). He languished till death in hopeless captivity, subjected to all the cruelties an oriental imagination could suggest. It is said that he was tortured into betraying to Sapor the city of Antioch and the passes of the Taurus, and that after his death his skin was stuffed, painted purple, and preserved as a trophy of victory.

Valerius Flaccus. See FLACCUS.

Valerius Maximus, a Roman author, who, about 29–32 A.D., wrote in a bombastic style a somewhat miscellaneous collection of historical anecdotes. There are recent editions of the *Factorum et Dictorum Memorabilium Libri IX.* by Halm (1865) and Kempf (2d ed. 1888).

Valetta (*La Valetta*), a fortress and beautiful city, capital of Malta, on the north-east side of the island. It occupies a rocky tongue of land over 3000 yards long, on either side of which are two noble harbours which are well worthy of the city's importance as chief naval station of Britain in the Mediterranean. The town and harbours are defended by a series of fortifications of great strength, many of them hewn out of the solid rock, and, mounted with the most powerful artillery, considered impregnable. The city proper on the rocky ridge has several suburbs on the other side of the harbours or on minor spits running into them. Besides the enormous forts, balconies, and battlements which are the principal architectural characteristics of the city, Valetta contains many noble edifices. The governor's palace—formerly that of the Grand-masters of the order of St John—is plain without, but magnificent within, and possesses an interesting armoury; the cathedral of St John is a superb structure; and the church of San Pubblio, with its famed *sotteraneo* ('vault') of embalmed monks and skeletons, the public library of 60,000 vols., the university, and the aqueduct, which brings water to the city from the far side of the island, a distance of 8¾ miles, are worthy of notice, as well as many of the palazzi of the Maltese nobles. There is a railway to Rabat in the interior. The city was named after the Grand-master La Valette, though there were fortifications and dwellings here long before that date. Valetta is the centre of the commerce of the island (see MALTA, and map given there). Pop. of Valetta (1891) with its suburbs of Floriana and Sliema, 37,350; of the other 'three cities' or suburbs of Senglea, Cospicua, and Vittoriosa, 24,802; collectively 62,152.

Valette, JEAN PARISOT DE LA (1494–1565), born of a noble family of Toulouse, entered the order of the Knights of St John, of which order he was elected Grand-master in 1557. His life thenceforward is a series of exploits in warfare with the Turks, culminating in his famous defence of Malta, lasting from 18th May 1565 till 8th September. The Turks had 159 war-ships and 30,000 men; the defenders were 8500 men, with 700 knights, and unsupported held the fortifications heroically in spite of awful loss and privations, till the approach of a Neapolitan fleet caused the Turks to raise the siege. The veteran commander died 28th August 1568. See MALTA, HOSPITALLERS.

Valguarnera, a town of Sicily, 16 miles E. by N. of Caltanisetta. Pop. 11,341.

Valhalla, Valkyrjur. See SCANDINAVIAN MYTHOLOGY.

Valla, LAURENTIUS, a great humanist of the Renaissance, born in 1405 at Rome, where, and afterwards at Florence, he studied the classics, which he taught chiefly at Pavia. Having incurred many enmities, he shifted his quarters from one university town to another, much to their advantage and his own, till he found a protector at Naples in King Alfonso V., whose military fortunes he shared by sea and land. Rehabilitating Epicurus against scholastic depreciation, he was expelled from Rome, whose claims to temporal power he attacked. Continuing to lead an actively controversial and scholarly life, he was prosecuted by the Inquisition in the diocese of Naples, but underwent neither condemnation nor punishment. In 1448 we find him again in Rome as apostolic secretary to Nicholas V., whom he eulogised as 'the common father of the learned.' He died 'worn out by continual alternations of humiliation and redress,' in the flower of his age, in 1457. His vagrant, agitated life considered, he wrought marvels for scholarship and literature. Latin style (as commemorated by George Buchanan in two famous epigrams) owes him the deepest debt, while his versions of Xenophon, Herodotus, and Thucydides, made from texts which he had himself to purify, if not actually construct, extort even still the admiration of philologists. His scientific insight into language and idiom was only less than his gift of eloquence and invective. New Testament criticism he signally advanced by his comparison of the Greek original with the Vulgate. His *Elegantiæ* of Latin speech was long a class-book in the schools; while his *De Donatione Constantini Magni* remains a weapon valued by assailants of the temporal power.

See Mancini's brilliant and exhaustive monograph (Florence, 1891) for the investigation and settlement of disputed points in Valla's life, and Symonds, *The Renaissance in Italy* (1877).

Valladolid, a famous city of Spain, sometime capital of the whole country, and still capital of a province of Old Castile (q.v., and see SPAIN), stands on a plain on the left bank of the Pisuerga, 150 miles NW. of Madrid by rail. It is 2200 feet above sea-level, and has a healthy climate, the air being pure and the sky generally cloudless. The Museo contains such of the statues, carvings, and sculptures as could be collected at the suppression of convents in the province. The Classical cathedral (1585) was never finished; there are some fifteen other churches. Of the once numerous monasteries the Dominican house, of which Torquemada was prior, is now a house of correction, and that of the Benedictines is a barrack. The university dates from 1346. The Scots College here was long the only seminary for the education of Scots Catholics; see SCOTLAND (ECCLESIASTICAL HISTORY). Some of the squares are very large. The city, which contains a royal palace and many other public buildings, is fortified. Manufactures are springing up; silk, cotton, and woollen stuffs, jewellery, hats, paper, perfumery, chemicals, gloves, &c. are manufactured; there are iron-foundries; and though the place has a dull appearance, trade and industry have lately grown. The province is a great cornfield. Pop. (1877) 52,206; (1887) 62,018. Valladolid, the *Pincia* of Ptolemy, is first men-

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tioned as *Vallisoletum* in 1072. Charles V. erected many splendid edifices here. About this time Valladolid was the most prosperous city in Spain, containing 100,000 inhabitants. Formerly capital of Castile and Leon, it was still the usual residence of the kings. In 1560, under Philip II. (who was born here), Madrid was declared the only court; and from this time the prosperity of Valladolid declined. In 1808 it was sacked by the French, and much damage done to buildings and pictures.

Valladolid, a town of Yucatan, founded in 1543, 90 miles ESE. of Merida. Pop. 3500.—See also MORELIA.

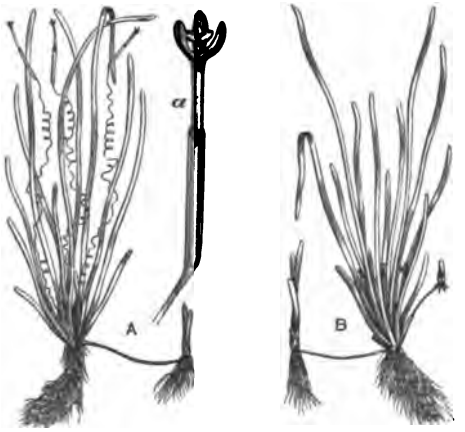
Vallauri, TOMMASO, Latinist, was born in 1805 at Chiusa di Cuneo, and in 1843 became professor at Turin. He has published editions of numerous Latin classics, including Plautus, Horace, Cicero, Sallust, Curtius, in whole or in part, besides dictionaries, epitomes, books on the literature of Piedmont, and an autobiography (1879).

Vallejo, a port of California, on San Pablo Bay, 31 miles by rail NE. of San Francisco. It has a good harbour, ships large quantities of grain, and contains shipyards and several factories. Here, on Mare Island, is a navy-yard. Pop. (1890) 6343.

Valleyfield, a town of Quebec, on the St Lawrence, 54 miles by rail SW. of Montreal. A fall of 15 feet supplies water-power, and the place contains a cotton-mill employing 1000 hands, woollen, flour, and saw mills, canning and door and sash factories, &c. Pop. 6500.

Valleys, low-lying or hollow tracts on the earth's surface between mountains or elevated ground. They are generally parallel to the direction of the ridges; but some are transverse, cutting through mountain-chains. As a rule they have a watercourse at or near their lowest level. The origin of valleys and their growth are dealt with in numerous articles in this work: see EARTH (Vol. IV. p. 164), DENUDATION, GEOLOGY (Vol. V. p. 149), MOUNTAINS, LAKE, and especially RIVER; besides those on notable valleys, as that of the Colorado, Yosemite, &c., and the mountain-systems which enclose such—Alps, Appalachians, &c.

Vallisneria, a genus of the natural order of plants Hydrocharideæ. Its one species, *V. spiralis*,



Vallisneria spiralis:
A, female plant; *a*, female flower; B, male plant.

is an aquatic found in fresh-water lakes and streams in the tropical and warm regions of the earth. They generally grow in running waters. *V. spiralis* is particularly celebrated on account of its peculiar process of fecundation. At the time when this is to take place the flowers of the female plants rise to the surface of the water by means of their long spirally-twisted stalks. The flowers of the male plants, in order to follow them thither, become detached, having previously grown on short stalks at the bottom of the water, and expand, liberating their pollen, which, floating about upon the surface, comes in contact with the female flowers which are stationary. After fecundation the female flowers return under the water by the spiral contraction of their stalks, and the fruit is ripened under water. This plant is found in ditches and bogs in Italy and the south of France, and is frequently grown in aquaria in Britain and other countries. Considerable depth of water should be provided for it, as the leaves are long, and should always be submerged.

Vallombrosa ('Shady Valley'), a celebrated abbey among the Apennines, 15 miles E. of Florence, in a valley surrounded with forests of fir, beech, and chestnut trees. Here an order of Benedictine monks was founded about 1038. They became very wealthy through donations, and the present magnificent buildings were erected in 1673. In 1869 the monastery was suppressed; but the place is still much visited by artists and tourists. Vallombrosa was visited by Dante, celebrated by Ariosto in the *Orlando Furioso*, and is mentioned by Milton in the *Paradise Lost*.

Valls, a manufacturing town of Spain, 12 miles N. of Tarragona. The French defeated the Spaniards here in 1809. Pop. (1887) 13,274.

Valmy, a French village in the department of Marne, 20 miles NE. of Châlons. Here on 20th September 1792 took place the famous 'cannonade of Valmy,' in which the Prussians under the Duke of Brunswick maintained for some hours a heavy fire on the army of the republic, and then retreated (see DUMOURIEZ). The loss was trifling on either side; but Valmy has not unjustly been treated by Creasy as one of the great battles of history, inasmuch as it was the first triumph of the republican arms—a triumph by which, with characteristic impulsiveness, the French were transferred from the depths of despair to the very pinnacle of self-confidence. When Napoleon was creating his 'noblesse' this great service rendered to France by Kellermann was fitly remembered by his title of *Duc de Valmy*.

Valois, HOUSE OF. See FRANCE, Vol. IV. p. 778. The ancient Valois, first a county, then a duchy, now forms part of the depts. of Oise and Aisne.

Valonia, a vegetable product very extensively used by tanners, in consequence of its being rich in tannic acid. It is the acorn-cup of a species of oak (*Quercus ægilops*) indigenous to the Levant. It is largely exported from Asiatic Turkey and to a less extent from Greece.

Valparaiso ('Vale of Paradise'), the second city of Chili, and next to San Francisco the principal American port on the Pacific, is situated on the bay of the same name, 115 miles by rail WNW. of Santiago, and 881 W. of Buenos Ayres by the Trans-Andine Railway. The bay is horseshoe shaped, open towards the north, and in winter a dangerous anchorage. The city is built chiefly upon a gently sloping plain at the head of the bay, which is, however, cut up by many ridges of hills that terminate in bluffs near the water's edge, and that are often so steep as to require staircases to pass from one part to another. Its long streets of busy shops and handsome private buildings, with several imposing churches, trams, gas, and here and there the electric light, suggest much more a European than a South American city. The old town, El Puerto, contains the vast customs warehouses, huge elevators, the mole and harbour,

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wharves, the exchange, post-office, and municipal palace, with a bronze statue of Lord Cochrane in the plaza in front; above it rises the Cerro Alegre, with a Protestant church and the pretty houses of some of the foreign merchants. In the eastern portion of the city, where the houses are mostly of one story, are the theatre and railway station. Batteries crown the heights and also guard the harbour. Valparaiso's imports exceed £5,000,000 and its exports £2,000,000. It suffered from earthquakes in 1822 and 1851; was bombarded by a Spanish fleet on 31st March 1866, when much property was destroyed; and after a great three days' battle near by, August 21–23, during the civil war of 1891, fell to the insurgents on August 27, when looting and incendiarism cost the city nearly $2,000,000. Pop. (1885) 115,147.

Valpy, RICHARD, D.D., was born in Jersey, 7th December 1754, and had his education at Valognes in Normandy, Southampton grammar-school, and Pembroke College, Oxford. He took orders in 1777, was the successful head-master of Reading grammar-school (1781–1830), as well as rector of Stradishall in Suffolk from 1787, and died at Kensington, 28th March 1836. His Greek and Latin grammars carried his name far beyond the bounds even of the large influence of a head-master of fifty years.—His brother, Edward Valpy (1764–1832), was head-master of Norwich School from 1810, and left *Elegantiæ Latinæ* (1803), and an edition of the Greek Testament (3 vols. 1810).

Valtelline (*Val Tellina*, Ger. *Veltlin*), the rich and fertile valley of the upper Adda down to its influx into the Lake of Como. In a wider sense the term covers the whole of that part of Lombardy which includes this valley, as well as Chiavenna and Bormio, corresponding to the modern province of Sondrio. The 120,000 inhabitants speak a dialect of Italian akin to the Romansch (q.v.). In the 16th century the district became subject to the Swiss canton of Grisons (q.v.); the latter, however, steadily resisted the efforts of the Valtellines to secure citizenship, which resulted in the bloody Valtelline war (1620). The Grisons was victorious, and governed the Valtelline more oppressively than ever, till at the petition of the inhabitants Napoleon incorporated the country with the Cisalpine republic, and the Valtelline has since shared the fortunes of Lombardy and Italy.

Valuation is the process of fixing the price or rent to be paid for a piece of property. Surveyors and valuers are often called upon to advise persons who propose to become purchasers, lessees, or mortgagees of real estate; trustees are, generally speaking, bound to take a professional opinion before advancing trust moneys on the security of land, &c. When property is required as a qualification for a franchise or office the law prescribes the rules for ascertaining the value. Again, property must be valued in order to determine the taxation to which it is subject; thus the whole property of a deceased person is valued for probate and succession duty. Domesday Book (q.v.) contains a valuation for feudal purposes of the lands of England, except the four northern counties. When revenue was raised by means of subsidies the burden was distributed 'according to the faculties of men'—i.e. according to ability to pay: land, offices, and personal property were all valued for taxation. In 1692 a new valuation was made for land-tax, and lands continued to be assessed as in that year until the Act of 1798 by which the old land-tax was rendered permanent, and means were provided for its gradual redemption. The true land-tax of our own day is the landlord's property-tax collected under schedule A of the Income-tax Act. See Griffith's *Valuation*.

VALUATION OF LANDS in Scotland seems first to have been made in the 13th century. Next century a new valuation was made by authority of parliament; and as prosperity increased this *new extent*, as it was called, came to be much above *old extent*, and the new was often fixed by adding a certain proportion to the old extent. Under Cromwell and after the Restoration the total sum to be raised by taxation was first fixed, and then distributed amongst the counties, commissioners having the power to alter the old valuation. The *valued rent* thus arrived at was the basis of the land-tax till 1854, when the commissioners of supply in counties and the magistrates in burghs were directed to make a valuation roll annually showing the value of all lands and heritages within the county or burgh, according to which roll all local assessments were to be made, and assessors were to be appointed to carry out the act. By the Local Government Act, Scotland, 1889, the powers of the commissioners of supply were transferred to the county councils.

Value, one of the fundamental conceptions of political economy, has been the subject of many controversies, and has been variously defined. Usefulness does not determine value in the economic sense. Air is eminently useful, but it is not valuable in that sense: hence 'value in use' is distinguished from 'value in exchange,' and the latter is treated as the only meaning relevant to economic science. Thus value depends on usefulness and difficulty of attainment. There can be no absolute standard of value; but to avoid too rapid and violent fluctuation values are usually measured by the precious metals (see MONEY). A *general* rise of values is impossible; if there is a general rise in prices this means that the value of money has fallen. Mill established three laws of value, varying as the objects dealt with were (1) absolutely limited in quantity, like pictures by a dead artist; (2) capable of being increased by proportionally greater labour, like agricultural produce from a limited area; (3) capable of being increased indefinitely without increased cost of production. Ricardo's too abstract doctrine that value depends simply on the quantity of labour expended implies disregard of interest, profits, risk, different rates of wages, and other elements of the question.

For Marx's doctrine of surplus value, see MARX, SOCIALISM. On the wide subject of value generally, see the works of Ricardo, Mill, Fawcett, Jevons, and other works cited at POLITICAL ECONOMY.

Vambéry, ARMINIUS, traveller and philologist, was born at Szerdahely in Hungary, 19th March 1832. At twelve he was apprenticed to a ladies' dressmaker, but afterwards took to teaching. Next he entered a school at St George, Presburg, helped by various friends; he was soon able to speak Latin with fluency. In 1846 he entered a school at Coronation, where he struggled to support himself, undaunted by want and privation. His holidays were spent in tramping through the country; at sixteen he was conversant with several languages. A strong desire for eastern travel led him to Constantinople, where he applied himself to the study of Oriental languages. In 1858 he issued a German-Turkish dictionary. He was made corresponding member of the Hungarian Academy, and in 1861 he received a travelling stipend of a thousand florins. In 1862–64 he travelled in the disguise of a dervish, by routes unknown to Europeans, through the deserts of the Oxus to Khiva, and thence by Bokhara to Samarcand. His position precluded him from making instrumental observations for the purposes of geography, but was eminently favourable to an insight into the customs and language of the peoples visited.

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His valuable *Travels and Adventures in Central Asia* (Lond. 1864) was written out in three months from meagre pencil notes on scraps of paper. As a result of his experience he has spoken and written in favour of British influence in the East as against the rule of Russia. In his periodical and other writings Vambéry supports the idea that the rule of England in the East is most beneficent, that of Russia the least so. He has repeatedly lectured in England and lectured on this subject.

His other publications are partly philological and ethnographical, partly also historical and political. To the former belong his works relating to the Eastern Turkish and Tartar languages, such as the ethnography of the Turks, the origin of the Magyars, &c., whilst the latter comprise his *Wanderings and Adventures in Persia* (1867); *Sketches of Central Asia* (1868); *History of Bokhara* (1873); *Central Asia* (1874); *The Origin of the Magyars* (1882); *Arminius Vambéry, his Life and Adventures* (1883); *The Coming Struggle for India* (1885); and, with Heilprin, *Hungary* (1887), besides several contributions to the present work.

Vampire. One of the most gruesome superstitions in the world is that of the Vampire, of the dead leaving their graves to destroy and prey upon the living. It is characteristically Slavonic, though by no means exclusively so, and it is strongest of all in White Russia and the Ukraine. It still dominates the popular imagination in Russia, Poland, Servia, among the Czechs of Bohemia, and the Slovaks of Hungary, and also in a less degree in Albania and Greece. The modern Greek term for a vampire is *βουρκόλακας*, which Bernhard Schmidt identifies with the Slavonic name of the werewolf (Bohemian, *vlkodlak;* in Bulgarian and Slovak, *vrkolak*), the regular name for a vampire in Servia being *vukodlak*. The Russian *vampir* (South Russian, *upuir*, anciently *upir;* Polish, *upior*) in his earthly life was a wizard, a witch, a werewolf, a suicide, or one cursed by his parents or the church. But even an innocent man may involuntarily become a vampire by himself falling a victim to one, or merely by a cat or a bird accidentally crossing his corpse before its burial. And we find a survival of this notion in Henderson's account of how the Northumbrians at once put such a cat to death. Such bodies do not decay in the kindly earth, for when a vampire's grave is opened no trace of death is seen on the corpse; he lies turned in his grave, with fresh cheeks, open staring eyes, the skin, hair, and nails still growing. During the night he rises from his grave and sucks the blood of sleepers, who pine and die while he draws his nourishment from their life. He can only be laid to rest by a stake (in Russia of aspen) being driven through his body at a blow—a custom only abolished in the case of suicides in England by 4 Geo. IV. chap. 52. Sometimes when he first awakes in the grave to his unhallowed shadowy life he begins to gnaw his own hands and feet, or to chew his shroud, causing his kindred to pine away and die. In many cases such witches only devour the hearts of their victims, or steal them out of their bodies, substituting for them the heart of a cock or a hare, and so destroying the nature. The stolen heart they expose over a magic fire in order to create hopeless love-longings in the breast from which it was taken—an idea which Jakob Grimm says lies at the foundation of our metaphorical phrases within the vocabulary of love of 'giving' or 'stealing one's heart.'

Such a notion of a nocturnal demon eating out the souls or hearts and sucking the blood of men gives to the primitive mind a natural and rational explanation of such phenomena as a patient seen becoming from day to day, without apparent cause, thin, weak, and bloodless. We find it widely prevalent in popular folklore, and imbedded in the doctrine of folk-medicine, sorcery, and witchcraft everywhere, and Dr Tylor refers it directly to the principles of savage animism. We need not linger over Afanasief's mythological interpretation of how the sucking of the sleeper's blood symbolises the drawing of rain from the clouds by the thunder-god and the spirits of the storm at the close of the death-like sleep of winter. The likeness to the corpse-eating *ghouls* of Oriental folklore and the *'alûkah* of Proverbs xxx. 15 is apparent, and scarcely less the points of contact with the still more widely-spread superstition of the Werewolf (q.v.). Teutonic mythology has parallels enough of animated corpses returning to satisfy a thirst for blood or their carnal appetites, and it is a commonplace of popular folklore that it is fatal to meet a *revenant* of any nature. Hertz notes that little is known of regular 'corpse-spectres' among races which burn their dead, and Hanusch maintained that therefore the ancient Slavonians who burned the dead must have borrowed the vampire superstition from some other race. But, as Ralston points out, it is not certain that burial by cremation was universally practised by the heathen Slavonians, Kotlyarevsky's conclusion being that there never was any general rule, some burying without burning, others burning first and then burying the ashes.

See W. R. S. Ralston's *Songs of the Russian People* (1872) and *Russian Folk-tales* (1873); W. Mannhardt, 'Ueber Vampyrismus' in vol. iv. (Gott. 1859) of the *Zeitschrift für Deutsche Mythologie;* W. Hertz, *Der Werwolf* (Stuttg. 1862); and Richard Andree, *Ethnographische Parallelen und Vergleiche* (Stuttg. 1878).

Vampire-bat, a name given to various kinds of bats, as being supposed to suck blood like the vampire, though few of those so called really indulge this propensity. Thus some of the frugivorous bats called 'flying foxes' (see BAT) of Asia, Africa, and the Malay Archipelago are so termed; so are some of the South American insectivorous Chiroptera; so are several genera of the Phyllostomatidæ (see figure at BAT), especially the perfectly harmless *Phyllostoma spectrum*, two feet in expanse of wing, with a well-developed nose-leaf. The real blood-suckers belong to the genera Desmodus and Diphylla, forming the family Desmodidæ, found in Central and South America. These have a bifid foliaceous appendage, two large projecting incisor teeth, and two lancet-shaped superior canines, and they attack cattle and horses and sometimes human beings when asleep.

Van, a walled town of Turkey in Asia, capital of a vilayet, stands near the south-eastern shore of Lake Van, 145 miles SE. of Erzerum. Once the capital of an Armenian kingdom, it is situated in a very fertile plain on the borders of Armenia and Kurdistan, contains mostly mud-houses of two stories, and narrow, dirty streets, and has some manufactures. Pop. 35,000, mainly Turks, with some Armenians and Kurds. It claims to have been the 'city of Semiramis.'—The LAKE OF VAN is a considerable inland sea, 80 miles long and about 30 in breadth; area, 1200 sq. m. It has no visible outlet. In its brackish waters a kind of bleak is caught, salted, and exported.

Vanadium (sym. V, equiv. 51·2), a rare metal of little practical importance. The name was first given to a substance then believed to be an elementary metal, but which has since proved to be a compound. The discovery of this substance, the vanadiate of lead, was made by Del Rio in 1801, but it was not till 1867 that the metal itself was first prepared by Roscoe. Vanadium possesses a silvery lustre, and has a specific gravity of 5·5. It burns readily in a flame or when heated in oxygen. It unites with nitrogen to form a nitride. Its salts are of little importance.

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Vanbrugh, SIR JOHN, dramatist and architect, was the grandson of a Protestant refugee of Ghent, and the son of a Cheshire sugar-baker, and is supposed to have been born about 1666. He was educated in France, and hardly had he returned than his wit, his handsome figure, and his geniality won for him a footing in society. In 1695 he was made one of the commissioners for finishing the palace at Greenwich for the purposes of a hospital. His first plays were the *Relapse, or Virtue in Danger*, brought out at Drury Lane with great success in 1697, and the *Provoked Wife*, produced at the theatre in Lincoln's Inn Fields. He then in partnership with Congreve started an unsuccessful theatre in the Haymarket, and there brought out the *Confederacy*. In 1702 he built Castle Howard in Yorkshire for the Earl of Carlisle, and such was now his reputation that he was commissioned to erect Blenheim House. The queen supplied from her private purse the money required, and Marlborough left a fund to meet the architect's claims, but the imperious duchess not only refused to pay Vanbrugh his salary, but dismissed him from his office. Finally he got nearly all the money that was due to him, but naturally ever after was the sworn foe of the Duchess of Marlborough. In 1714 he was made comptroller of royal works, was knighted at the accession of George I., acted as Clarencieux king-at-arms from 1705 to 1725, and died at Whitehall, March 20, 1726, leaving his *Provoked Husband* unfinished. Vanbrugh's plays lack the polish and refinement of Congreve's, but are free from his artificiality and laboured brilliancy. The interest is well sustained throughout; the characters are real, natural, and racy, the situations striking, and the dialogue bright and vigorous. But he is grossly indecent beyond all the allowable bounds of humour, and his grossness seems in grain. He failed pitifully in his attempt to repel the onslaught of Jeremy Collier. His architectural works are massive and pictorial; and if they gave rise to the witticisms of Swift and Pope, they gained the praises of Sir Joshua Reynolds. See Leigh Hunt's *Comic Dramatists*.

Van Buren, MARTIN, eighth president of the United States, was born 5th December 1782, the son of a small farmer, at Kinderhook, New York. He became office-boy to the village lawyer, studied hard, and was called to the bar in 1803. Long before this, however, he had developed a precocious interest in politics, and at the age of eighteen we find him already member of a nominating convention. In 1812 and 1816 he was elected to the state senate, and in 1815–19 he was state attorney-general. In 1821 he entered the United States senate, of which he was a member until his election in 1828 to the governorship of New York. In the same year he zealously supported Jackson for the presidency, and in 1829 he was rewarded with the portfolio of secretary of state. This he resigned in 1831. Two years later he was elected vice-president, and in 1835 president, but by a popular majority of less than 25,000, and that largely owing to his declared opposition to the 'slightest interference' with slavery. Van Buren's four years of office were darkened by the gloom of financial panic; but what one man could he did to lighten it, by wringing from congress its assent to a measure for a treasury independent of private banks. This and his firm adherence to obligations of neutrality during the Canadian rebellion of 1837 are his most statesmanlike acts, but both cost him popularity and votes: in 1840 he and his party were overwhelmingly defeated by the Whigs. He lost the nomination in 1844, because he opposed the annexation of Texas; and his nomination by the Free Soil party in 1848 only secured the return of the Whig candidate and the rejection of both Democrats. This was his last important appearance, and he died at Kinderhook, 24th July 1862. Van Buren was a master of the politician's arts, but he used his great skill for what he counted the highest ends. He loved not to follow, but rather to make public opinion and a party for himself; for he had on the whole a statesman's soul and not a place-hunter's. So we see him often doggedly ranging himself on the unpopular side—favouring negro suffrage, and opposing an elective judiciary. He was intensely partisan, trained a Jefferson Democrat, and loyal to his early teaching; yet his political antipathies did not destroy his warm private friendship for great opponents such as Henry Clay.

See Lives by W. L. Mackenzie (Boston, 1846) and E. M. Shepard ('American Statesmen' series, 1888), and George Bancroft's eulogistic *Martin Van Buren to the End of his Public Career* (New York, 1889).

Vancouver, a town of British Columbia, the terminus of the Canadian Pacific Railway (1887), stands on Burrard Inlet (at its head is Port Moody, formerly the terminus; pop. 3000), 2906 miles by rail W. by N. of Montreal. Its site a dense forest till 1885, it now possesses miles of well-made streets, lit by gas and electricity, electric trams, a handsome opera-house, a hospital, three parks, many good buildings of brick and granite, extensive wharves and warehouses, smelting-works, &c., and has a regular steamship service to China, Japan, San Francisco, and Alaska. Pop. (1890) 14,000.

Vancouver Island, belonging to British Columbia, lies in 48° 19′—50° 53′ N. lat. and 123° 17′—128° 28′ W. long., and is separated from the mainland by Queen Charlotte Sound, Johnstone

Strait, and Strait of Georgia, which taken together form an open sea-way. The island is 278 miles in length, and from 50 to 65 miles in breadth; area, 15,937 sq. m.; pop. 30,000. Its outline is boldly picturesque. The shores are marked by abrupt rocky cliffs and promontories, by pebbly beaches and sheltered coves, with fine harbours. The western shores are gloomy and frowning in aspect, deeply indented by fiord-like arms of the sea, the banks of which are formed by steep rocks rising like walls. The whole country is more or less densely wooded, except where the mountain-summits afford no foot-hold for plants, or where open grass-lands occur. There are no navigable rivers, and the streams, which are torrents in winter, and are nearly dry in summer, are short, and are valuable

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only as supplying power for mills. The climate resembles that of southern Britain; the warm Pacific Gulf Stream striking the coast preserves a mild and agreeable temperature; and in the south-east, where there is much less rain than in the north or on the mainland, snow seldom falls. Only a small proportion of the surface is suited for agriculture—perhaps a million acres. Fruit-culture is profitably carried on. The island is very rich in minerals. Besides gold, silver, copper, iron, &c., it possesses great fields of excellent coal, at Nanaimo in particular: the output in 1891 was 1,029,097 tons (678,140 in 1890). Another source of wealth is in the fisheries; good banks lie off the coast, and fish and fish products to the value of $1,200,000 annually are exported from Victoria (q.v.), the capital.

The island was discovered in 1592 by Juan de Fuca, and visited in 1792 by Captain George Vancouver (1758–98), an officer in the British navy; but the first permanent settlement was not made till 1843, when the Hudson Bay Company built a fort and trading post where Victoria now stands. Its later history, along with other information, will be found at COLUMBIA (BRITISH).

Vandals, a Teutonic race, settled at their first appearance in history in the north-east of Germany in the region between the Vistula and the Oder. Thence they moved southward, suffered severe defeats from Aurelian, and later from the Goths under Geberich, and were permitted by Constantine to settle in Pannonia, where they became Christians of the Arian pattern. But at the beginning of the 5th century, urged, said his enemies, by Stilicho, they entered Gaul, and crossed the Pyrenees into Spain in 409. The Asdingian section settled in Galicia, and were almost entirely destroyed in the struggle with the Goths and Suevi; the Silingian Vandals, together with the allied Alans, settled in a part of Bætica, which received from them the name of *Vandalitia* (Andalusia). In 429, on the call of the rebel to the empire, Bonifacius, governor of Africa, they crossed the Strait of Gibraltar, under their dreaded leader, Genseric (q.v.), carrying such devastation and ruin from the shores of the Atlantic to the frontiers of Cyrene that their name has lived on the lips of man for fourteen centuries. After the death of Genseric (477) his son, Hunneric, cruelly persecuted the Catholics, and kept the Mediterranean in terror by his piracies. His successors, Guntamund (d. 496) and Thrasamund (d. 523), were comparatively mild and tolerant rulers, but luxury had already begun to weaken the fibre of the ancient Vandals. Hilderic showed such strong leanings towards Catholic orthodoxy that his subjects grew discontented, and he was overthrown by his uncle, Gelimer, in 530. The Emperor Justinian sent Belisarius against the latter in 533, and the year after he surrendered, and was carried to Constantinople in triumph. Most of the Vandals were drafted into the imperial army, and sent to perish in the endless wars with Persia.

See the various histories of the Roman Empire, but especially Papencordt, *Geschichte der vandalischen Herrschaft in Africa* (Berl. 1837); also Felix Dahn's *Könige der Germanen* (part i) and Hodgkin's *Italy and her Invaders* (vols. ii. and iii.). See also Wrede, *Ueber die Sprache der Wandalen* (Strasb. 1886).

Vandamme, DOMINIQUE JOSEPH, general, was born 5th November 1771 at Cassel, in the dept. of Nord, and during the revolutionary war was distinguished as commander of the Chasseurs de Mont-Cassel. In 1799 he was a general of division, fought at Austerlitz, reduced Silesia in 1806 and 1807, and repeatedly commanded an army corps, but was defeated and taken prisoner at Kulm in 1813. He held a command during the Hundred Days, and after the second restoration was exiled, but returned from America in 1824 to die at Cassel, 15th May 1830. See the Life by Du Casse (1870).

Vanderbilt, CORNELIUS, was born on Staten Island, New York, in 1794, and at the age of sixteen bought a boat and ferried passengers and goods across to the city. Gradually extending his enterprise, by the age of forty he had become the owner of beautiful sound and river steamers running to Boston and up the Hudson; in 1849 he founded a line, *viâ* Lake Nicaragua, to California, and during the Crimean war he established a line of ocean steamships to Havre. A little later he transferred his capital from steamships, and at the age of seventy entered on a great career of railroad financing, gradually obtaining a controlling interest in a large number of roads, until he extended his system to Chicago. The Grand Central depôt in New York City was erected by him. At his death in 1877 he left a fortune of some $100,000,000, nearly all to his eldest son; shortly before he had given $1,000,000 to found Vanderbilt University at Nashville.—His son, WILLIAM HENRY (b. 1821), had been business manager of his father's railroads, and afterwards greatly extended the Vanderbilt system. He died in 1885, and was succeeded by his two eldest sons, Cornelius (b. 1843) and William Kissam, his principal heirs. See Croffut, *The Vanderbilts and the Story of their Fortune* (1886).

Vanderdecken. See FLYING DUTCHMAN.

Van der Goes, HUGO, a Flemish painter of the school of Van Eyck, was born in Ghent, and was dean of the painters' guild there in 1473–75. Soon after he withdrew to a monastery at Soignies, where he died bereft of reason in 1482. Only one of the works attributed to him—a triptych in the hospital of Santa Maria Nuova at Florence, consisting of an adoration of the infant Christ by the Virgin, with portraits—is indisputably genuine. The famous Stewart triptych at Holyrood is believed by good judges to be his; and there are works attributed to him in the National Gallery and many continental collections.

Vandevelde, WILLIAM, the Elder, was born at Leyden about 1611. Till 1657 he practised his calling as a marine painter at Amsterdam, then settled in England, and became painter of sea-fights to Charles II. and James II. He died in London in 1693.—WILLIAM VANDEVELDE, the Younger, was born at Leyden or at Amsterdam in 1633, and in due time followed his father to England, where Charles II. gave him a pension of £100 to colour his father's drawings. He died at Greenwich, 6th April 1707, leaving behind ample justification for his fame as one of the greatest of marine painters. Smith catalogues 330 of his paintings.—ADRIAN VANDEVELDE, his brother, born at Amsterdam in 1639, gained high estimation as an animal and landscape painter, and died 21st January 1672. See E. Michel, *Les Van de Velde* (1892).

Van Diemen's Land. See TASMANIA.

Van Dyck, SIR ANTHONY, portrait and history painter, was born at Antwerp, 22d March 1599, the seventh child of Frans Van Dyck, a silk and woollen manufacturer of the city, and his second wife, Maria Cuypers, a lady celebrated for her skill in embroidery. In 1609 he entered the studio of Hendrik Van Balen, a capable painter of the place; in his fifteenth year he began to study under Rubens, and in 1618 he was admitted a master of the Antwerp Guild of St Luke. He soon came to be recognised as the most promising of the pupils of Rubens. In the contract, dated 1620, for the decoration of the Jesuit Church of Antwerp it was stipulated that he was to assist his master in

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the production of thirty-nine pictures; and the 'Christ Bearing the Cross,' in the church of the Dominicans, may be referred to as a work of this period. In 1620 the Earl of Arundel was advised that 'his works are beginning to be scarcely less esteemed than those of his master;' and in the end of that year Van Dyck made a brief visit to England, when he appears to have executed the full-length of James I. at Windsor. In 1623, by the advice of Rubens, he started to study in Italy; and, on his way, he is said to have fallen in love with a beautiful country girl of the little village of Saventhem, near Brussels, and to have delayed there, painting his famous 'St Martin dividing his Cloak,' still in the parish church, and a 'Holy Family,' since lost. The investigations of M. A. Wauters and other critics, however, have thrown doubt upon the details of this traditionary episode in the painter's life.

Arrived in Venice, he devoted himself to an enthusiastic study of the masterpieces of Titian, Giorgione, and Veronese; and, passing to Genoa, he executed there a series of noble portraits, strongly impressed with the influence of Italian art, many of which are still preserved in the palaces of the families for whom they were painted. In Rome he resided for nearly two years, producing a 'Crucifixion' for Cardinal Bentivoglio, and for the pope an 'Ascension' and an 'Adoration of the Magi.' After visiting Turin and Sicily, he again worked in Genoa, and by 1628 he had returned to his native city, where he painted his great 'Ecstasy of St Augustine' for the chapel of the Augustine monastery, a work spoiled by the changes insisted on by the monks, various subjects for the Célibataires, and the splendid 'Christ crucified between two Thieves' for the church of the Récollets at Mechlin, now in the cathedral there. It was about this period that he executed the fine series of *grisaille* portraits of eminent contemporaries which were published as engravings by Martin Vanden Enden, and with additions in 1641 by Giles Hendrix of Antwerp. In some twenty of these plates the painter himself etched the heads, and in their early states, before the line-work of the engravers has been added, these prints are greatly valued. The astonishing spirit, vigour, and expressiveness of the lines by means of which the features are rendered entitle Van Dyck to rank as one of the master etchers of the world.

In 1629 the painter again visited England, but he received little encouragement, and soon returned. We next find him at the Hague, painting the Prince of Orange and his family, Christian, Duke of Brunswick, and Count Ernest of Mansfeld; and in the spring of 1632 he again came to London, under the patronage of the Earl of Arundel, and was warmly received by Charles I., who had been impressed by his portrait of Lanière the musician, and had purchased his 'Armida and Rinaldo.' He was knighted by the king, appointed his principal painter in ordinary, installed at Blackfriars, and assigned a country residence in Eltham Palace; and in 1633 a pension of £200 was bestowed upon him, which, however, was very irregularly paid. One of his earliest works during this residence in England was the group of the king, queen, and two of their children, at Windsor; and during the next eight years he painted nearly every distinguished person connected with the court. About 1639 he married, through the influence of the king, Maria Ruthven, granddaughter of the first Earl of Gowrie. Leading a careless life and lavish in his pleasures, Van Dyck suffered from pecuniary straits; and frequently he found difficulty in obtaining payment for the royal commissions. He proposed to decorate the walls of the banqueting-room at Whitehall—the ceiling of which had been painted by Rubens—with a history of the order of the Garter, and prepared sketches of the subjects, but the work was never carried out. The greater part of 1634 and 1635 was spent in the Netherlands, when he painted Ferdinand of Austria, brother of Philip IV., now at Madrid, and many other portraits, and such religious subjects as 'The Adoration of the Shepherds,' in the church at Termonde, and 'The Deposition,' now in the Antwerp Museum; and at this time he was elected honorary president of the Antwerp Guild of St Luke. In 1640 he visited his native city for the last time, and then passed to Paris, hoping to be employed by Louis XIII. on the decoration of the Louvre; but here again he was unsuccessful, though he received other commissions. On his return to England he found that political troubles were distracting the country. His own health was now permanently broken, and he died in his house at Blackfriars, 9th December 1641, and was buried in Old St Paul's.

By universal consent Van Dyck is one of the most refined and graceful of painters. His portraits are full of expression, easy and natural in their attitudes, and the hands, in particular, are most elegant in form and pose. His religious subjects are distinguished by correctness of design, delicate blending of tones, and truth and purity of colouring. Most of the great English galleries contain examples of Van Dyck's art. Rich collections of his portraits were included in the Manchester Art Treasures Exhibition of 1857, and the National Portrait Exhibition of 1866; and in 1887 a special exhibition of 166 of his works was brought together in the Grosvenor Gallery. Seven of his works are in the National Gallery. These include his portrait of Cornelius Vander Geest, and the noble equestrian portrait of Charles I., purchased for £17,500 from the Blenheim Palace collection in 1885.

See Smith's *Catalogue Raisonné of the Works of the most Eminent Dutch, Flemish, and French Painters*, pt. iii. (Lond. 1841); William Hookham Carpenter's *Pictorial Notices, a Memoir of Sir Anthony Van Dyck, with a Catalogue of his Etchings* (Lond. 1844); Robert Dohme's *Kunst und Künstler*—'A. Van Dyck,' by Carl Lemcke in vol. i. (Leip. 1875); F. Wibiral's *L'Iconographie d'Antoine Van Dyck d'après les recherches de H. Weber* (Leip. 1877); P. R. Head, *Van Dyck and Hals* ('Great Artists' series, 1879); A. Michiel's *Ant. Van Dyck et ses Elèves* (Paris, 1881); J. Guiffrey's *Antoine Van Dyck, sa Vie et son Œuvre* (Paris, 1882); *Eaux-fortes de Van Dyck reproduites par Amand-Durand, texte par Georges Duplessis* (Paris, n.d.); H. G. Stephens' *Catalogue of the Grosvenor Gallery Exhibition* (Lond. 1887).

Vane. SIR HENRY, was born at Hadlow, Kent, about 1612. His father, 'old Sir Henry' (1586–1654), was a bustling and time-serving statesman, who rose to be principal secretary of state, but who, having, with his son, been a chief agent in Strafford's destruction, was six months later deprived of his offices, and sided thereafter with the triumphant party. 'Young Sir Henry' in his 'fourteenth or fifteenth year was awakened from good-fellowship,' and at Magdalen Hall, Oxford, whither he passed from Westminster in 1628, appears to have embraced those republican principles for which he afterwards became so famous. His travels to Vienna and Geneva (1631) confirmed him in his aversion to the government and discipline of the Church of England; and in 1635 he sailed for New England—the refuge of disaffected spirits in those days. He was chosen governor of Massachusetts; but his advocacy of toleration, and bias to the Antinomian views of Anne Hutchinson (q.v.), soon robbed him of his popularity, and in 1637 he returned to England. He married in 1640 a daughter of Sir Christopher Wray of Ashby, Lincolnshire; in the same year entered

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parliament for Hull; and through his father's influence was made joint treasurer of the navy and knighted. Already, however, he had formed a close friendship with Pym and Hampden; and when the Civil War broke out no man was more conspicuous in the military and theological politics of the time than Vane. He relinquished the profits of his office (equivalent now to £30,000 per annum); he carried to the Upper House the articles of impeachment against Archbishop Laud; he was a 'great contriver and promoter of the Solemn League and Covenant' (though in his heart he abhorred both it and presbytery, and used them solely to attain his ends); with Cromwell he engineered the Self-denying Ordinance and the New Model (1644–45); and through the ten years 1643–53 'he was unmistakably the civil leader—that in the state, said his enemy Baxter, which Cromwell was in the field.' So, too, the sonnet by Milton. But he had no share in the execution of the king, and he did not view with satisfaction the growing power of Cromwell and the army. On the establishment of the Commonwealth he was appointed one of the Council of State; but it was largely Cromwell's dislike to his redistribution bill (1653) that prompted the dissolution of the Rump, when Vane's protest, 'This is not honest,' was met by Cromwell crying out with a loud voice, 'O Sir Henry Vane, Sir Henry Vane! the Lord deliver me from Sir Henry Vane.' Retiring to his Durham seat, Raby Castle, he there wrote his *Healing Question* (1656), whose hostility to the protectorate brought him four months' imprisonment in Carisbrooke Castle. On Cromwell's death he returned for a while to public life, but in the July following the Restoration was arrested and sent to the Tower. Thence he was shifted to the Scilly Islands, and thence brought back two years later to be tried for high-treason. Charles II. wrote to Clarendon, 'He is certainly too dangerous a man to let live, if we can honestly put him out of the way;' and on 14th June 1662 Vane was beheaded upon Tower Hill. Christopher, the youngest of his seven sons, was raised to the peerage by William III., and from him the Duke of Cleveland is descended. Vane's is a puzzling character, for he was a singular compound of a sane and far-seeing statesman, pure and high-minded withal, and of a fanatical and impracticable Fifth Monarchist. Rightly to comprehend him one should study his incomprehensible writings.

See the Lives by George Sikes (1662), Charles W. Upham (Sparks's 'American Biography,' Boston, 1835), John Forster ('Statesmen of the Commonwealth,' 1840), and James K. Hosmer (Boston, 1888).

Van Eyck. See EYCK.

Vanilla, a genus of epiphytal Orchideæ, natives of tropical America and Asia. They are distinguished from most other orchids by their climbing habit; they cling with their aerial roots to the stems of trees or to rocks, attain the height of 20 or 30 feet, and obtain their chief sustenance from the atmosphere. There are about twenty species comprised in the genus. The flowers are thick, fleshy, and fragrant, but dull in colour. Vanilla is remarkable among orchids as possessing the only species of the order that has any economical value. From the fruit of several species the vanilla of commerce is obtained, the best being produced by the West Indian species, *V. planifolia*, which is now cultivated in many tropical countries. The fruit is cylindrical, about a span long, and less than half an inch thick. It is gathered before it is fully ripe, dried in the shade, and steeped in a fixed oil, generally that of the cashew nut. It contains within its tough pericarp a soft black pulp, in which many minute black seeds are imbedded. It has a strong, peculiar, agreeable odour, and a warm, sweetish taste. Benzoic acid is sometimes so abundant in it as to effloresce in fine needles. Vanilla is much used by perfumers, and also for flavouring chocolate, pastry, sweetmeats, ices, and liqueurs. Balsam of Peru is sometimes used as a substitute for it. When the fruit of vanilla is fully ripe a liquid (*Baume de Vanille*)

Vanilla planifolia, portion of stem with spike of flowers: *a*, a seed pod.

exudes from it. Vanilla has ripened its fruit in British hothouses, but the flowers are apt to fall off without fruit being produced, unless care is taken to secure it by artificial impregnation. This is, in some measure, the case even in India and in some parts of America itself.

Vanini, LUCILIO, freethinker, was born at Taurisano in the Neapolitan territory in 1585, and at Naples and Padua studied the new learning of the Renaissance and the newer learning of physical science, qualified as *doctor utriusque juris*, and took orders as priest. But his 'naturalist'—anti-Christian and anti-religious—views soon brought him into collision with the church. Having taught in various parts of France, Switzerland, and the Low Countries, he had to flee from Lyons to England, where also he was imprisoned. At Genoa, Paris, and Toulouse he was constantly in trouble for his heresies, and at Toulouse he was arrested and condemned to first have his tongue cut out, then to be strangled, and finally to be burned to ashes (19th February 1619). From his *Amphitheatrum Æternæ Providentiæ* (1615) and his *De Admirandis Naturæ Arcanis* (1616) it is plain that, if he was not an atheist, he taught pantheism of an extreme type; and he was more notable for vanity and audacity than for learning or speculative originality. But as an innovator he has many points in common with Bruno (q.v.), besides sharing a similar fate. There are monographs by Fuhrmann (Leip. 1800), Vaisse (Paris, 1871), and Palumbo (Naples, 1878).

Vanloo, JEAN BAPTISTE, a member of a family originally Flemish, in which a love of art seemed indigenous, was born at Aix in Provence in 1684. He painted successively at Nice, Toulon, and Aix, visited Genoa and Turin, and was sent by the Prince of Carignano, son-in-law of the Duke of Savoy, to study at Rome under Benedetto Luti. After a further residence at Turin, he proceeded in 1719 to Paris, and speedily acquired a great reputation as a portrait-painter. He was made a member of the Academy in 1731, and professor of

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Painting in 1735; visited London, where he painted Colley Cibber and Sir Robert Walpole; and died at Aix, 19th December 1745.—CHARLES ANDRÉ VANLOO, his younger brother, was born at Nice, 15th February 1705. He also studied at Rome under Benedetto Luti, and then settled in Paris, but later returned to Rome. At Turin he painted for the king of Sardinia a series of subjects illustrative of Tasso, after which he returned to Paris, and was appointed in 1735 a member of the Academy, and later a knight of the order of St Michael, and chief painter to the king. He died at Paris, 15th July 1765.

Vannes, a seaport town of France, capital of the dept. of Morbihan in Brittany, stands at the mouth of a tributary of the Gulf of Morbihan, 10 miles from the sea. The cathedral (13th to 15th centuries) is the most important edifice; but the town possesses also an old Maison du Parlement and many carved houses, and a rich museum of Celtic antiquities. Manufactures of woollens and ropes and some shipbuilding are carried on; and the small port has some trade. Pop. (1881) 16,667; (1891) 19,625.

Vannucci. See PERUGINO.

Van Rensselaer, STEPHEN, eighth 'patroon' of the vast estate near Albany, now forming three entire counties, which was first acquired by Killian Van Rensselaer (1595–1644), was born in New York, 1st November 1765, educated at Harvard, and in 1783 married a daughter of General Philip Schuyler. He was a leader of the Federalists in his state, and served in the state senate and assembly, and in congress from 1823 to 1829. For a while during the war of 1812 he held command on the northern frontier, and captured Queenston Heights; but the refusal of his cowardly militia to cross the Niagara River enabled the British to recover the place, and the general resigned in disgust. He was a moving spirit in the construction of the Erie and Champlain canals, and president of their boards from 1811 till their completion in 1825; and in 1824 he founded at Troy the Polytechnic Institute which bears his name. He died 26th January 1839.

Vansittart, NICHOLAS, afterwards Lord Bexley, was the son of a governor of Bengal, and descendant of a family originally from Sittart in Jülich. Born in 1766, and called to the bar in 1791, he entered parliament as a Tory in 1796, and after a mission to Denmark held a series of posts in successive ministries till in 1812 he succeeded Mr Perceval as Chancellor of the Exchequer, and in 1823 was raised to the peerage and made Chancellor of the Duchy of Lancaster. In 1810 he proposed (against Horner) the motion against resuming cash payments to the Bank of England; at the exchequer he left a large surplus. He was president of the Bible Society, and zealous in religious and philanthropic work. He died 8th February 1851.

Van Veen, an occasional name for the meritorious Haarlem painter, Martin Jacobsz Heemskerk (1498–1574).—OTTO VAN VEEN was a native of Leyden, born *c.* 1556. He studied art at Liége and Rome, settled first at Brussels, next at Antwerp, where the great Rubens was his pupil. Van Veen stood high in the favour both of Parma and the next governor, the Archduke Albert of Austria. He died in Brussels about 1634.

Vapour. See MATTER, FLUID, GAS, STEAM.

Var, a dept. in the extreme south-east of France; area, 2349 sq. m.; pop. (1872) 293,757; (1891) 288,336. The dept. receives its name from the river Var, which formerly served as its boundary on the east, but which, since the arrondissement of Grasse was taken from Var and added to the Alpes Maritimes, now belongs entirely to the latter. Var is well watered by a great number of streams, of which the chief are the Gapau, Argens, and Bianson. In the north and north-east it is mountainous, being traversed by a branch of the Alpes de Provence, called the Monts de l'Esterel. Between the mountains and the watercourses are many very fertile valleys. The climate, tempered by the altitude of the surface, is pleasant. Fruits of all kinds are here cultivated with remarkable success; tobacco is grown, and much wine is produced. The dept. abounds in minerals, and carries on an active commerce. It is divided into the three arrondissements of Draguignan, Brignoles, and Toulon. Capital, Draguignan.

Varallo, an Italian town in a beautiful valley amidst the foothills of the Pennine Alps, 35 miles NW. of Novara by rail; pop. 2500. On the Sacro Monte there is a famous Calvary.

Varangians. See NORTHMEN, RUSSIA, p. 40.

Varanidæ. See MONITOR.

Varasdin. See WARASDIN.

Vardö, a small town on the narrow Norwegian island of Vardö, at the eastern extremity of Finmark (pop. 1322). Here over 5000 fishermen come in the spring to fish; whaling with harpoon-guns is busily carried on, and the carcasses are towed to Vardö to be boiled.

Varennes, a town of 1900 inhabitants in the French dept. of Meuse, 18 miles NW. of Verdun, where Louis XVI. and his family were captured in the attempt to escape across the frontier, 22d June 1791.

Varese, a town of Northern Italy, at the end of Lake Varese (7 sq. m.), 18 miles by rail W. of Como, with delightful climate and surroundings. An old Roman and Lombard city, it has an old ducal palace, a church with a fine tower (246 feet), and manufactures of silk, &c. Pop. 5872.

Variation, in Music, a transformation of a melody by melodic, harmonic, contrapuntal, and rhythmic changes. The subject chosen is called the theme; it is first simply harmonised with or without an introduction, and then repeated in a variety of different transformations, and the variations collectively with the theme constitute the piece. Occasionally the different variations are combined by an intermediate passage; but generally each has its separate close, and the whole terminates with an extended and richly-developed variation, or a coda.

Variation is the departure in any direction from the mean character of the species. When the variation in a large number of individuals, generally more or less isolated in space, is of a marked and constant type, the group of individuals which exhibit such variation is termed a variety. On the Darwinian Theory (q.v.) the existence of variation in the individuals of a species under nature is essential to natural selection, which proceeds by the elimination of those individuals varying in such manner as to render them unsuited to the conditions of their existence; just as the similar variation of domesticated animals and plants is the basis of artificial selection, which proceeds by the intentional choosing out of those individuals varying in any desired or desirable direction.

A question which is to-day much discussed among biologists is whether variation is determinate or indeterminate in direction; that is to say, whether organic forms have or have not any tendency to vary in particular ways. According to the extreme advocates of the Darwinian Theory there is primitively no tendency to any special mode of variation, any existing tendency being the result of the selection of those individuals

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which chanced to vary along these particular lines. According to other biological observers and thinkers there is, apart from the guidance of natural selection, an inherent bias, differing in different groups of organisms towards variation in determinate lines. This may be due to the inheritance of characters individually acquired under the stress of surrounding conditions (direct environmental determinism); or to constitutional tendencies inherent in the individuals of each species, and analogous to the inherent tendencies of inorganic substances, such as *calcite* or *aragonite*, *hornblende* or *augite*, to assume definite crystalline forms (innate specific determinism); or to the deep-seated antithesis of nutrition and reproduction as conditioned by the organic nature of the species (protoplasmic or physiological determinism).

It has been claimed by certain American biologists that palæontological evidence establishes the existence of determinate variation. The teeth and the limb-bones of more than one series of fossil ungulates are found to exhibit variation along definite and determinate lines. The facts may be admitted; but the reasoning based thereon is inconclusive. The variation adduced is confessedly along lines that are advantageous to the individuals in which it occurs. It would, therefore, on the Darwinian Theory, escape that elimination which would be the fate of non-advantageous and neutral variations. This may be made clearer by an illustration. Suppose a pendulum free to swing in any direction. Let a number of slight impulses indeterminate in direction be applied to it, but let all those which are in any but one particular direction be damped down and thus eliminated. Let this occur many times in succession, and the result will be that the pendulum will swing with considerable amplitude in the determinate direction through the checking of the oscillations in all other directions. So, too, if the teeth of mammals varied indeterminately, and if all variations save those along one line (or several correlated lines) were neutral or non-adaptive, these latter would be eliminated through inter-crossing, while the adaptive variation would become evident. In the fossil forms the variations along non-adaptive lines would be so slight as to escape detection, while those in a plus or minus direction along adaptive lines would be assigned to different stages in the evolution of the variation in question.

We seem forced, therefore, to the observation of existing forms if we would settle the question of the determinate or indeterminate nature of variation. Even here the difficulties are great if not insuperable. For if we take the individuals descended from a particular pair of parental organisms, it is scarcely possible to prove that determinate variation, should it be found to occur, is not the result of hereditary idiosyncrasy peculiar to those parents. And if we take the adult individuals of the species indiscriminately, it is scarcely possible to prove that determinate variation, should it be found to occur, is not the result of the elimination, at an early stage of life, of those individuals which were found wanting in this adaptive variation.

A. R. Wallace and others have tabulated some results of the observation of variation in the state of nature; and Wallace has shown that variations in size or length of particular parts are considerable, 'usually reaching 10 or 20, and sometimes even 25 per cent. of the varying part,' and occurring in 5 to 10 per cent. of the specimens examined. These results incidentally show that in the species under examination there was no very rigid elimination, and that inter-crossing did not suppress variations from the mean to such an extent as is sometimes supposed.

As a concrete example of variation we may take that which is found to occur in the 'wing'-bones of bats as observed and tabulated by the present writer. The wing of the bat was selected (1) because the bones are readily measured even in dried specimens; (2) because they form mutually related parts of a single organ; and (3) because they offer facilities for the comparison of variations, not only among the individuals of a single species, but also among several distinct species. The bones chiefly concerned are those of the arm and forearm, the metacarpals, and the phalanges of the digits. A glance at the tables dealing with the noctule (*Vesperugo noctula*), the long-eared bat (*Plecotus auritus*), the pipistrelle (*Vesperugo pipistrellus*), and the whiskered bat (*Vespertilio mystacinus*), together with the measurements of the greater and lesser horseshoe bats (*Rhinolophus ferri-equinum* and *R. hipposideros*), show (1) that variations of not inconsiderable amount (10 to 12 per cent., or even in some cases twice this amount) occur among the related bones of the bat's wing, and (2) that these variations are to a considerable extent independent of each other. Comparing now not individuals of the same species, but the mean results for different British bats, it is shown that the different types of wing may have resulted from emphasising certain variations and suppressing others. For example, the long and narrow wing of the noctule would result from the accentuated development of the metacarpals of the second and third digits and the correspondingly reduced development of the metacarpals and phalanges of the fifth digit. On the other hand, the broad and ample wing of the horseshoe bats would result from the reduction in length of the second and third metacarpals, and the relative increase in the length of the phalanges of the fourth and fifth digits and of the tibia of the hind-limb to which the hinder edge of the wing-membrane is attached.

On the hypothesis of indeterminate variation it must be confessed that we are to-day not much in advance of Charles Darwin, who said: 'Our ignorance of the laws of variation is profound. Not in one case out of a hundred can we pretend to assign any reason why this or that part has varied.' It may fairly be surmised that the variation in size of parts may result from variation in the vascular and nervous supply of such parts. But how these variations in vascular and nervous supply are occasioned we do not know. When we say that they are the result of chance and are indeterminate, we merely mean that their causes are unknown, and that the mode of their determination is at present undiscovered.

Weismann has endeavoured to elucidate the problem of the origin of variations by the study of the germinal cells from which the individual is developed. A portion of the nuclear substance of the ovum or egg is lost before or slightly after the act of fertilisation by the extrusion of the polar cells. It may be that by this process, and possibly analogous processes in connection with the sperm, material is got rid of, the loss of which by disturbing the hereditary equilibrium gives rise to variation. Weismann maintains that amphimixis, or the mingling of the peculiarities of two individuals in fertilisation, 'has arisen from the necessity of providing the process of natural selection with a continually changing material, by the combinations of individual characters.' The suggestion has hardly yet, however, got beyond the speculative stage.

Much careful work is being done by Poulton and others on the influence of the environment on the individual with the production of acquired variations not necessarily inherited. Caterpillars of the pepper-moth (*Amphidasis betularia*) reared from eggs produced by the same mother and fed on the

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same food-stuff were found to vary from nearly black through brown and gray to green (due to the colour of the blood showing through the transparent skin) according as the twigs or other objects upon which they habitually rested were dark or light. The nature and proximate causes of individual variation, and the experimental inquiry whether such variations are in any cases inherited, offer a wide field for future research.

For references, see article HEREDITY; cf. also Darwin's *Origin of Species* (1859), *Variation of Animals and Plants under Domestication* (1868), &c.; Spencer's *Principles of Biology* (1866), *Factors of Organic Evolution* (1886); E. D. Cope, *Origin of the Fittest* (New York, 1887); P. Geddes, article 'Variation and Selection,' *Ency. Brit.*; A. R. Wallace, *Darwinism* (Lond. 1889); the present writer's *Animal Life and Intelligence* (1890), 'Nature and Origin of Variation' (*Proc. Bristol Nat. Soc.*, vi. 1890–91); G. J. Romanes, *Darwin, and After Darwin* (1892); H. de Varigny, *Experimental Evolution* (Lond. 1892); and A. Weismann, *Essays upon Heredity and Kindred Biological Problems* (Oxford, 1889–92).

Varicose Veins. When a vein becomes dilated at a certain part of its course, for no apparent physiological object, such as relieving the venous circulation elsewhere (as, for example, in the case of the superficial abdominal veins enlarging in order to relieve a compressed vena cava), it is said to be varicose, the actual dilatation being called a *varix* (a word used in this sense by Cicero and Celsus). Some veins seem to be unaffected by varices, which, however, are of common occurrence in the sub-mucous veins of the rectum (constituting hæmorrhoids or Piles, q.v.), in the spermatic veins, giving rise to Varicocele, and in the veins of the lower extremities. They are occasionally (but very rarely) found in other veins. Certain conditions of the system favour the formation of varices, amongst which may be noticed an indolent temperament, and a debilitated condition of the general system, accompanied by a relaxed state of the walls of the veins; and possibly also a congenital predisposition or hereditary tendency. Persons with such a predisposition are more likely to suffer from this affection if their occupation is one which involves much standing or walking; and cooks, washerwomen, and foot-soldiers have been selected as specially prone to varicose veins. Varices may occur at almost any period of life, but are chiefly developed during middle age. Their formation is aided by any condition of the system which impedes the circulation, as certain diseases of the heart, lungs, and liver, and by continued *high living*, which is especially liable to induce hæmorrhoids. Direct pressure on the veins, e.g. by the use of garters, or by habitual constipation, is often an important factor in their production. From the researches of Andral, it appears that in varicose veins the coats of the dilated vessels may become thickened or may become thin; that they may be lengthened so that the veins become tortuous; and that the dilatation may be unequal, giving rise to the formation of pouches; and that, in consequence of the enlarged calibre of the vessels, the valves only act imperfectly, and gradually undergo degeneration.

Varicocele occurs as a tumour in the scrotum, most often on the left side, generally and aptly described as feeling under the fingers 'like a bag of worms.' It is rarely serious or painful, but often causes much anxiety and mental distress. The use of a well-fitting suspensory bandage and free bathing with cold water are generally efficient in keeping it in check; but it is often removed by operation, particularly when it prevents the patient's entrance into one of the public services.

Varices occurring in the leg, to which our remaining observations apply, commonly give rise to deep-seated aching pain in the limb, with a sense of weight, fullness, and numbness, before there is any external appearance of the affection. In a more advanced stage the ankles swell in the evening, and the feet are always cold. After a time a small tumour of a bluish tint appears, which disappears on pressure, but returns on the removal of the pressure, and is caused by a dilating vein. This dilatation extends, and forms knotty, irregular tumours, soft to the touch, diminishing on pressure or on the patient's assuming a horizontal posture, and giving a bluish tint to the adjacent skin. These tumours commonly occur in the middle of the leg, along the track of the saphena veins, but they often extend along the whole of the leg and thigh. Amongst the troublesome consequences of varicose veins are the obstinate ulcers, known as varicose ulcers, to which they give rise; and it must be borne in mind that occasionally, when the skin gets thinned by prolonged pressure, the varices burst through it, and give rise to hæmorrhage, which, if not promptly stopped, may cause fainting, and even death. When such an accident occurs the patient should at once be placed in a horizontal position, and the leg raised, in which case the bleeding will probably cease. If it continue, a pad of lint must be pressed upon the mouth of the bleeding vessel by means of a few turns of a bandage round the limb.

Treatment must in the main be palliative; pressure on the veins by garters, constipation, &c. must be removed; the general health must be attended to, liberal diet with tonics, or restricted diet with mild purgatives, being enjoined according to the patient's requirements. The weakened veins must be supported when the patient is going about by suitably regulated pressure; the application of a domett or india-rubber bandage every morning before rising is the most satisfactory method; but an elastic stocking is less trouble, and is more commonly used. The obliteration of one set of varices by operation is generally followed by the dilatation of adjacent veins. If, however, the varicose veins give rise to much discomfort, or prevent the healing of an ulcer, operation is often justifiable, and is followed by great relief. The operations employed may consist in the use of caustics, subcutaneous division of the veins, compression by ligatures or metal pins, or excision.

Variegation, in plants, is a condition in which other colours are exhibited in parts where the normal colour should be green. Thus white, yellow, or other tints take the place of green in the leaves and other herbaceous parts. Yet variegation is regarded in botany as a disease, the causes of which are unknown. All that is yet determined respecting it is that it is invariably accompanied by a more or less complete suppression of the chlorophyll, the green granular matter which underlies the cuticle of the green parts of plants. Although often presenting similar peculiarities to chlorosis, another plant-disease, the cause of which is equally obscure, variegation is distinguished from it by the presence of chlorophyll in larger or smaller patches in the leaves, branches, or stems of the affected subjects. Variegation is usually a permanent characteristic, or may be made so by careful methods of propagation, and is compatible with vigorous health. These considerations give an importance to variegated plants in ornamental gardening which they would not otherwise possess. Variegated pelargoniums and many other bedding plants, perennial herbs and annuals, and some shrubs and trees derive their popularity as ornaments of the flower-garden from their variegation, which in many cases is so brilliant that it is substituted for flowers in the production of colour effects. Variegation is rarely perpetuated by seed; when it appears in a plant it can only be increased by

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means of cuttings, layers, division, or budding and grafting. In rare instances some tendency is shown in variegated plants to revert to the normal state; this is especially so in those that are grafted or budded, and is supposed to be due to the action of the stock upon the scion. Inversely also the scion is found to exert a similar influence upon the stock occasionally, as in the case of some Abutilons, causing a perfectly distinct and permanent variegation to appear in the branches which spring from it. Reversion to the original state is usually prevented by pruning away the first indications of it, always removing the bud whence the green part shoots. In herbs which are propagated by division annual division is in many cases necessary in order to preserve the variegation.

Varinas (*Barinas*), a town of Venezuela, on the San Domingo, 100 miles SE. of Lake Maracaybo. Once famous for its tobacco, it has sunk under insurgent wars to 7000 inhabitants.

Var'ola. See SMALLPOX.

Varna, a seaport of Bulgaria, on the northern side of a semicircular bay, an inlet of the Black Sea, 115 miles SE. of Rustchuk by rail. Varna yielded to the Russians in 1828. The allied French and British troops were here encamped for some time in 1854, and occupied the town. Though the harbour is exposed, a considerable trade is carried on, the value of the year's imports averaging £600,000, and of the exports (mainly grain) £350,000. The Congress of Berlin in 1878 decided that the strong fortifications by which the port was formerly defended should be destroyed, and the Bulgarians resolved to supply the loss by earthworks. The town is the seat of Greek and Bulgarian metropolitans, and of a dozen consuls. Pop. (1888) 25,256, of whom 5000 are Greeks, 6000 Turks.

Varnhagen von Ense, KARL AUGUST, German biographer, was born at Düsseldorf, 21st February 1785. He studied, first medicine, then philosophy, at Berlin and Halle, aided Chamisso in his *Musenalmanach*, joined the Austrian army and was severely wounded at Wagram, served as adjutant to Prince Bentheim, and in 1813 entered the Russian service, and became adjutant to Tettenborn, accompanying him to Paris. Here he was called to the Prussian diplomatic service, and accompanied Hardenberg to the Congress of Vienna (1814) and to Paris, becoming next resident minister at Carlsruhe. Recalled hence in 1819, he lived chiefly at Berlin thereafter, till his death, 10th October 1858. He had married in 1814 the charming Jewess, Rahel (q.v.). His chief works are critical biographies, written in graceful and polished style.

Of his many books may be named *Goethe in den Zeugnissen der Mitlebenden* (1823); *Biographische Denkmäler* (5 vols. 1824–30); *Denkwürdigkeiten und vermischte Schriften* (7 vols. 1843–46; vols. 8 and 9 ed. by his niece, Ludmilla Assing, 1859). His *Tagebücher* fill 14 vols. (1861–70); an edition of his *Ausgewählte Schriften* alone, 19 vols. (1871–77). His correspondence also has been published, with A. and W. von Humboldt, &c.

Varnish. The greater number of varnishes consist of some resinous material (see LAC, and RESINS) dissolved in linseed-oil, alcohol, or some liquid hydrocarbon such as turpentine and benzole. Those made by dissolving a resin in a non-volatile drying oil, like that from linseed, are called oil-varnishes; and those prepared by using volatile solvents (alcohol, benzole, &c.) for the resins are called spirit varnishes. In the case of the latter the solvent becomes dissipated as the varnish dries, so that when any surface is coated with a varnish of this kind only a film or coating of resin remains, which is apt to crack and peel off; but means are taken either in the preparation of the varnish or in the laying of it on to counteract this tendency. With an oil-varnish, on the contrary, the oil remains as part of the coating, giving it toughness, while the resin gives it hardness.

For shell-lac varnish, the spirit-varnish most largely made, see FRENCH POLISHING; and for the varnish called Lacquer, used for coating brass, see that head. Bookbinders use a spirit-varnish, composed of elemi, mastic, and sandarac resins, together 14 parts, Venice turpentine 3 parts, and alcohol 30 parts. They also use among other lacquers one consisting of shell-lac 10, turpentine 1, and alcohol 30 parts. A good spirit-varnish for woodwork is sandarac resin 40, Venice turpentine 4, and alcohol (methylated spirit) 120 parts.

The best oil or fat varnishes are prepared from hard resins, along with linseed-oil and turpentine. Copal and amber, the two hardest resins, require a preliminary heating or fusing before mixing them with the solvents. The proportions given for a good copal varnish are 30 parts of melted copal resin, 100 parts of linseed-oil, and 70 parts of oil of turpentine, part of the oil in a hot state being first mixed with the melted resin. Three parts of litharge, or ¼ of a part of borate of manganese is added to act as a 'dryer.' Throughout the process of preparing the varnish a carefully regulated heat is used, and the temperature of the mixture is allowed to fall to 140° F. before the turpentine is added. A copal varnish is also made on a more limited scale by a newer process, which consists in first treating the resin with a powerful solvent (afterwards drawn off by distillation), such as acetone or ether, and afterwards adding 'manganese' oil (linseed-oil and borate of manganese) and turpentine. There are several kinds of copal resins (see COPAL); but the best kind is obtained from Zanzibar, and is now known to be produced by *Trachylobium verrucosum*. Inferior 'copal' varnishes are made from kauri and other cheap resins. The use of oil-varnishes which are sold at a low price (some of them at one-half that of good copal) should be avoided, as many of these never dry properly. An elastic varnish, useful for rendering textile fabrics waterproof, can be made with the aid of heat, by mixing together common resin 2 lb., caoutchouc 16½ oz., linseed-oil 2 lb. It may be stated here that, from the inflammable nature of the materials used, the making of most varnishes is attended with much risk of fire.

Oil-varnish is extensively used for coating the internal woodwork of houses, either after it has been previously painted, or simply to cover the bare wood without hiding its grain. Good copal varnish is the best kind that can be used for this purpose. If properly put on it forms a fine glossy, enamel-like surface, which is very durable, and stands washing with soap and water repeatedly without injury. To produce such a surface at least five coats of the varnish are required, and each in turn is rubbed smooth with pumice except the last. It is only in the best class of work, however, that more than two or three coats are given. A coating of varnish does not increase the durability of oil-paint on external woodwork.

A pure transparent mastic varnish is used for oil-pictures, but, as it has the defect common to spirit-varnishes of being easily abraded, copal oil-varnish is often preferred for this purpose. A less pure mastic varnish is used for maps. As spirit-varnishes dry very quickly, it is often convenient to use suitable kinds of them for coating metal, wood, &c., in cases where it is inconvenient to give proper time for oil-paint or oil-varnish to dry. Japan varnish is noticed under JAPANNING.

See Brannt's translation of Andres on *Volatile and Fat Varnishes* (1882), and Church's *Chemistry of Paints and Painting* (1890).

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Varnish Tree, a name given to trees belonging to several distinct natural orders, the resinous juice of which is used for varnishing or for lacquering. The Black Varnish Tree, *Melanorrhœa usitatissima* (Anacardiaceæ); the Japan Varnish Tree, *Rhus vernicifera* (Anacardiaceæ); the New Granada Varnish Tree, *Elœagia utilis* (Cinchonaceæ); and the Sylhet Varnish Tree, *Semecarpus anacardium* (Anacardiaceæ).

Varro, MARCUS TERENTIUS, the most learned of the Romans, was born probably of equestrian rank in the Sabine town of Reate, 116 B.C. He studied under L. Ælius Stilo, and at Athens under Antiochus of Ascalon, whose philosophy Cicero makes him expound as an interlocutor in the *Posterior Academics*. He saw some service under Pompey, and in the civil war was legate in Spain with Petreius and Afranius. He awaited the result of Pharsalia with Cicero and Cato at Dyrrachium, and was kindly treated by the conqueror, who appointed him to be librarian for his intended collection. The second triumvirate plunged him into danger, and Antony plundered his splendid Casine villa, burned his beloved books, and placed his name in the list of the proscribed. But he was soon exempted, and Augustus even restored his property, so that he was able to spend his latest years in peace. He survived till 27 B.C. Varro was a man of upright and honourable character, a monument of the old-fashioned Roman virtues, even to their hard and unsympathetic side. His diction shows qualities of the same kind—it is pithy and vigorous, but harsh, abrupt, without flexibility or charm. The total number of his works amounted to about 620 books, belonging to seventy-four different works. Of the poetical works (*saturæ*, *pseudo-tragœdiæ*, and *poemata*) we know nothing but the names. But of the 150 books of the *Saturæ Menippeæ*, a medley of prose and verse, imitated from the Cynic satirist Menippos (q.v.), enough fragments (ed. Riese, 1865; Bücheler, 1882) remain to prove the greatness of the loss. Here we find in singular medley grotesque personifications of ideas, ridicule of the philosophers, mythology, erudition, proverbs, bitter satire at the social corruptions of the day, and praise of the homely virtues of the good old times, the whole spirited and rich in humour, if seldom artistic in form. Varro's prose writings embraced oratory, history both general and literary, jurisprudence, grammar, philosophy, geography, and husbandry. The most important of these were his *Antiquitates Rerum Humanarum et Divinarum*, a work of vast learning in forty-one books, a mine in which burrowed Pliny, Plutarch, Gellius, Festus, Macrobius, as well as the Christian fathers, especially St Augustine; *De Lingua Latina*, in twenty-five books, of which only v.–x. are extant (ed. C. O. Müller, 1833; L. Spengel, re-edited by his son, 1885), on the formation and inflection of words, and on syntax, marred by arbitrary arrangement, and etymologies due to mere empirical word-play; *Rerum Rusticarum Libri III.*, almost entire (ed. Keil, Leip. 1884), in dialogue form, on agriculture, cattle, bird- and fish-breeding. His *Disciplinarum Libri IX.* deserved to live, being an attempt at an encyclopædia of the liberal arts; his *Imaginum Libri XV.*, or *Hebdomades*, was a series of 700 illustrated biographies of Greek and Roman celebrities with a metrical eulogium on each. See Ritschl's *Opuscula* (vol. iii.).—PUBLIUS TERENTIUS VARRO, distinguished from the foregoing as Atacinus from his birth at Atax in Narbonensian Gaul about 82 B.C., wrote an epic on Cæsar's wars in Gaul (*Bellum Sequanicum*), and satires at which Horace scoffs, while Quintilian characterises him as 'interpres operis alieni.' His *Argonautica*, a free adaptation of Apollonius Rhodius, delighted Ovid and Statius; his erotic elegies pleased Propertius. He died 37 B.C.

Varuna (akin to Gr. *Ouranos*), an ancient Indian Vedic god of heaven and day; latterly, rather the deity that rules over the waters. See VEDA.

Varus, PUBLIUS QUINTILIUS, was consul in 13 B.C., next governor of Syria, and about 7 A.D. was sent by Augustus to command the armies of Germany, and form that country into a Roman province. For the story of his disaster, see ARMINIUS. Varus killed himself in despair.

Varzin, a Pomeranian village of 1200 inhabitants, 25 miles SE. of Köslin, and notable as having near it the castle and park of Prince Bismarck.

Vasa, a county or *län* of Finland, on the Gulf of Bothnia. The noble Swedish family of Vasa (see GUSTAVUS VASA) is named from its armorial bearings, a bundle of yarn (*vasa*).

Vasarhely. See MAROS-VASARHELY.—Hódmezö Vasarhely, a Hungarian town 20 miles NE. of Szegedin by rail, had in 1890 a population of 55,483, great cattle-markets, and varied industry.

Vasari, GIORGIO, an Italian architect and painter, famous as a biographer and critic of artists, was born at Arezzo, 30th July 1511. He was a pupil of Michelangelo, and obtained the patronage of many distinguished persons, as Cardinal Ippolito de' Medici, Clement VII., and the Dukes Alessandro and Cosmo de' Medici; but his pictures (many of which still exist, as in the Palazzo Vecchio, Florence) possess no distinctive merit. His reputation rests exclusively on his *Vite de' più excellenti Pittori, Scultori, e Architetti* (1550; 2d ed. 1568; standard modern edition by Milanesi, 9 vols. 1878–85; Eng. trans. by Mrs Foster, 1850). This work is written, on the whole, in a simple and honest style; at times it is even marked by a noble eloquence. The criticism is often admirable; and in spite of frequent inaccuracies in the early biographies, it remains a model of art criticism and biography. Vasari died at Florence, 27th June 1574.

Vasco da Gama. See GAMA.

Vascular Tissue. See TISSUES.

Vase (Fr. *vase;* Lat. *vas*, 'a vessel'), a hollow vessel, usually decorated and decorative; modern vases being solely ornamental. Ancient vases were made of metal, stone, glass, or earthenware. Historically interest attaches chiefly to vases of glass and earthenware; and such vases—Egyptian, Phœnician, Greek, Etruscan, Roman, Chinese, Japanese, and modern European—are discussed, with illustrations, at GLASS and POTTERY. See also PORTLAND VASE.

Vaseline is a substance obtained from petroleum or paraffin, which is now of commercial importance. Yellowish, translucent, and crystalline in appearance, it is nearly of the consistency of soft soap, and is almost perfectly tasteless and inodorous. It is soluble in ether, and resists the action of most chemicals. Largely used as a salve or liniment, it is also made the base of various ointments and pomades; and it may be employed inwardly as a remedy in colds, coughs, and hoarseness. It is an excellent lubricant; is serviceable for protecting polished steel or iron from rust; and has the advantage over animal and vegetable fats that it does not become rancid. The name vaseline is copyright and refers only to one make of this article, but it is known in commerce under a host of fancy names, while it appears in the pharmacopœia as *Paraffinum molle*.

Vasishtha. See VEDA.

Vassal. See FEUDALISM.

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Vassar College, opened in 1865 for the higher education of women, lies to the east of Poughkeepsie, New York, in grounds extending to 210 acres—the gift, along with $800,000, of the founder, Matthew Vassar (1792–1868), who came a child from Norfolk, and died a wealthy brewer at Poughkeepsie. The main building provides accommodation for 300 students, and there are also a museum, an observatory, a laboratory, and a library of 16,000 volumes. Schools of painting and music were established in 1878. In the regular studies for the degree of A.B. elective courses are followed in the third and fourth years; and the degree of A.M. or Ph.D. is given for post-graduate work. In 1887 the first honorary degree, LL.D., was granted. See works by Lossing (1867) and Raymond (1873).

Vassilkov, a town of Little Russia, 18 miles SW. of Kieff. Pop. 18,000.

Vasto, a town of Southern Italy, on the Adriatic, 70 miles NW. of Foggia, with a small harbour, fisheries, olive-gardens, &c. Pop. 9761.

Vatican, see ROME, Vol. VIII. p. 785. The Vatican Council, which proclaimed the Infallibility (q.v.) of the Pope, met under the auspices of Pius IX. (q.v.) on the 8th December 1869, and was adjourned (but not dissolved, so that it might still reassemble) 18th July 1870. It is variously reckoned the 19th, 20th, or 21st of the Œcumenical Councils (see COUNCIL), and was attended by the largest number of ecclesiastics ever assembled at a council—by 764 out of 1037 entitled to attend. Of those present 276 were Italians. After the outbreak of the Franco-German war the attendance sunk to about 200. In the end Ultramontanism triumphed over the opposition of liberal bishops like Hefele and Strossmayer. The œcumenicity of the Council was denied by the Old Catholics (q.v.).

See the history by Cecconi (1873); Gladstone's *Vatican Decrees* (1874) and *Vaticanism* (1875), Manning's *True Story of the Vatican Council* (1877), and other controversial pamphlets; German works by Fessler (Catholic), Friederich and 'Janus' (Old Catholic), and Friedberg (Protestant); and the *Acta et Decreta* (new ed. 1892). For the Vatican MS. of the New Testament, see CODEX.

Vatke, WILHELM, theologian, born at Behndorf near Magdeburg, 14th March 1806, habilitated at Berlin as *privat-docent* in theology in 1830, was appointed professor extra-ordinary in 1837, and died 18th April 1882. His works were *Die Religion des Alten Testaments* (1835), *Die menschliche Freiheit* (1841), *Historischkritische Einleitung in das Alte Testament* (1886) and *Religionsphilosophie* (1888). He grasped the idea of the post-Exilic origin of the Priestly Code in the Pentateuch (q.v.) as early as Graf, but the names of both have paled before those of Kuenen and Wellhausen.

Vatnajokull. See ICELAND.

Vattel, EMÉRIC DE, writer on the law of nations, was born at Couret, in Neufchâtel (then Prussian), 25th August 1714. Trained for the church, he entered the diplomatic service of Saxony, and from 1746 till 1764 was Saxon representative at Bern. Here he published several works, but became known for his *Droit des Gens* (1758), which contained little that was new, but abridged and systematised the doctrines of Grotius, Puffendorf, and Wolf. It was often edited and translated, and had a greater vogue than it deserved. Vattel died 28th December 1767.

Vauban, SÉBASTIEN LE PRESTRE DE, military engineer and marshal of France, was born at Saint Léger du Fougeret, near Avallon in Burgundy, 15th May 1633. Left a destitute orphan at ten, he was brought up by the village *curé*, and at seventeen enlisted in the regiment of Condé, then in league with Spain against the king. Taken prisoner in 1653, he was persuaded by Mazarin to take service under the king, and in 1655 he received his commission as one of the royal engineers. Already in 1658 he had the chief direction of the attacks made by Turenne's army, and the eight years of peace that followed this campaign he devoted to works at Dunkirk and elsewhere. In 1667 he helped to reduce Lille, and next was appointed governor of its new citadel. During the campaigns in Holland (1672–78) he took part in seventeen sieges and one defence, rising to be brigadier and major-general, and at the close commissary-general of fortifications. He first introduced the method of approach by parallels at the siege of Maestricht (1673), and with such effect that that strong fortress capitulated in thirteen days. The rest of his more famous exploits in these campaigns were the triumphant defence of Oudenarde and the sieges of Valenciennes and Cambrai. During the ten years of peace which followed 1678 Vauban rendered to France perhaps the greatest of his services, in surrounding the kingdom with a complete cordon of fortresses (for his system, see FORTIFICATION); and he planned and partly executed the magnificent aqueduct of Maintenon, by which the waters of the Eure are conveyed to Versailles. In 1703 he rose to be marshal of France.

War breaking out again in 1688, Vauban conducted with his usual success the sieges of Philipsburg—introducing here his invention of ricochet-batteries—Mannheim, Mons (1691), and Namur (1692). The sieges of Charleroi (1693), Ath (1697), Breisach (1704), and the construction of the entrenched camp near Dunkirk (1706) are the only professional works of importance during the last fourteen years of his life. After the peace of Ryswick in 1697 he had applied his active mind to the consideration of various faults in the internal government of France, and he had observed the fatal consequences of the Revocation of 1685. His ideas he submitted in a memoir to Louvois and Madame de Maintenon in 1686. But another work, the *Dîme Royale* (1707), in which he discussed the question of taxation, and anticipated in the most striking manner the doctrines which eighty years later overthrew the French monarchy, brought down a heavier storm upon his head. Saint-Simon tells us the book was clear, simple, and exact, but the truths it told were unpalatably plain. In 1699 and again in 1704 he had sent it to the king, but no notice was taken till in 1706 he began privately to print 300 copies, whereupon the book was at once condemned. Vauban did not long survive his disgrace, dying at Paris, March 30, 1707. 'I have lost a man very devoted to my person and to the state,' said his self-complacent master. His body was buried at Bazoches; in 1806 Napoleon deposited his heart in the Invalides.

Saint-Simon describes Vauban as 'perhaps the most honest and most virtuous man of his age . . . never was man more gentle, more kindly, or more obliging.' Of middle height, hardy frame, blunt manners, sound judgment, and indomitable courage, he never experienced a reverse, yet all his success never turned his head nor impaired his modesty. He conducted fifty successful sieges, and designed or improved the works of more than 160 fortresses, among them Dunkirk, Landau, Lille, and Strasburg. He it was, and not Mackay, who in 1687 invented the socket instead of the plug bayonet.

In 1669 he wrote in six weeks for Louvois his *Mémoire pour servir d'Instruction dans la Conduite des Siéges*, published at Leyden in 1740. A selection of his MSS. formed the *Oisivetés de M. de Vauban* (4 vols. 1843–46). See Chambray, *Notice historique sur Vauban* (1840); Michel, *Histoire de Vauban* (1879); Ambert, *Le Maréchal de Vauban* (1882); also Major E. M. Lloyd's *Vauban, Montalembert, Carnot: Engineer Studies* (1887).

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Vaucluse, a department in the SE. of France, bounded on the west by the Rhone, and on the south separated by the Durance from Bouches du Rhone. Area, 1370 sq. m.; pop. (1872) 263,451; (1891) 235,411. The east is intersected by spurs of the Alps; in the west are plains. Agriculture is the chief occupation; of late oaks have been largely planted for the culture of truffles; and there are manufactures of silk, wool, pottery, chemicals, &c. Originally composed of the county of Venaissin, the principality of Orange, and part of Provence, the department is divided into the four departments of Apt, Avignon, Carpentras, and Orange, Avignon being the capital.—The village of Vaucluse (*Vallis clausa*) stands in a romantic ravine 19 miles E. of Avignon, and is noted as having been for sixteen years the residence of Petrarch, and for its famous fountain. Here, too, lived John Stuart Mill.

Vaud (Ger. *Waadt*), a canton which forms the western corner of Switzerland, between the Jura and the Bernese Alps. Area, 1244 sq. m.; pop. (1888) 247,655. It is a comparatively level district, traversed, however, by an elevated tract known as Mount Jorat, from which plains slope on either side to the Lake of Geneva on the south and the Lake of Neufchâtel on the north. On both sides, near the mountains, there are extensive pasture-lands, but the greater part of the country is highly cultivated. The vineyards yield white wines of excellent quality. Vaud forms part of French Switzerland; the religion is Protestant. After the fall of the Roman empire it belonged to the Burgundian kingdom, but in the 13th century it became a dependency of Savoy, and in 1536 the Bernese took possession of it. The French invasion put an end to the rule of Bern, and Vaud became a separate canton. The existing democratic-representative constitution dates from 1845 (see SWITZERLAND). Lausanne is the capital. See WALDENSES.

Vaudeville, originally a popular song with words relating to some story of the day; whence it has come to signify a play in which dialogue is interspersed with dances and songs of this description, incidentally introduced, but forming an important part of the drama. It is usually comic. The name Vaudeville is a corruption of Val de Vire, the name of a picturesque valley in the Bocage of Normandy. One Olivier Basselin, a fuller in Vire, composed about the middle of the 15th century a number of humorous and more or less satirical drinking-songs, which were very popular, and spread over France, bearing the name of their native place (Vaux de Vire).

Vaudois. See WALDENSES.

Vaudoux. See NEGROES.

Vaughan, CHARLES JOHN, was born at St Martin's vicarage, Leicester, in 1816, and had his education under Arnold at Rugby, and at Trinity College, Cambridge, graduating senior classic (bracketed with Lord Lyttelton) and chancellor's medallist in 1838. Elected next year to a fellowship in his college, he was successively vicar of St Martin's, Leicester (1841–44), head-master of Harrow (1844–59), and vicar of Doncaster (1860–69), when he was appointed Master of the Temple, as well as Dean of Llandaff in 1879. Already in 1860 he had declined the bishopric of Rochester; in 1882 he was named one of the Deputy Clerks of the Closet in Ordinary to the Queen. An eloquent preacher of the liberal evangelical school, he has published *Harrow, Temple,* and *University Sermons;* Lectures on Acts, Revelation, Philippians; editions of Romans, Philippians, Hebrews; *Family Prayers, Discourses on Liturgy and Worship,* &c.

Vaughan, HENRY, poet, styled 'the Silurist' from his having been born among the Silures of South Wales, was descended from an ancient family, and was born in 1621 at Newton, near Skethiog, in the parish of Llansaintfraed, Brecknockshire, twin-brother of the alchemist Thomas Vaughan (1621–65). He entered Jesus College, Oxford, in 1638, and shared the loyalty of his family, although apparently he did not actually bear arms in the cause. Early a devoted admirer of Ben Jonson, Randolph, and other poets of the day, in 1646 he published at London his first *Poems, with the tenth Satyre of Juvenal Englished.* He now studied medicine, became M.D., and retired to practise first at, and then near, Brecon. The collection of poems entitled *Olor Iscanus* ('Swan of the Usk') was sent to his brother at Oxford, and was published by him without authority in 1651. About this time a long and dangerous illness deepened his religious convictions, and henceforward the themes of all verse are the littleness of time and the greatness of eternity, the sinfulness of sin, the death and saving grace of Christ. In 1650 he printed at London his *Silex Scintillans* ('Sparks from the Flint-stone'), a collection of pious meditations after the model of Herbert (second part printed with it in 1655), and followed it up in 1652 with *The Mount of Olives,* a little book of devotions in prose, and the *Flores Solitudinis,* also in prose. Not till the year 1678 was another collection of his verses published, and this time again by a zealous Oxford friend ('J. W.') without his concurrence. This was the *Thalia Rediviva; the pastimes and diversions of a Country Muse,* a collection of elegies, translations, &c. of all periods of his life, closing with a few religious pieces (*Pious Thoughts and Ejaculations*), and a pastoral elegy on the death of his brother Thomas. Of the rest of his life we know nothing save that it wore itself away in the labour of his profession and in a quiet walk with God in his beloved vale of Usk. He died April 23, 1695. Vaughan's poetry is very unequal—his vein seems to have been a *flinty* soil, from which the right Promethean fire could be struck but now and then. At his best he reaches an exquisiteness of phantasy and of expression beyond the reach of Herbert, but by far the larger part of his poetry, and indeed of almost every poem, sinks below that more popular poet's usual level. 'The Retreat,' 'Childhood,' and especially 'Departed Friends' are some of the rarest flowers in the whole garden of our sacred verse, and atone for much uncouthness, obscurity, and prose. The first of these has been claimed as the prototype of Wordsworth's greater *Ode,* and it certainly supplies a dim hint of its fundamental thought.

There is a complete edition by Dr A. B. Grosart (privately printed, 4 vols. 1868–71). The *Silex Scintillans* and other sacred poems were published, with a memoir, by the Rev. H. F. Lyte in 1847 (repr. 1858). See Dr John Brown's *Horæ Subsecivæ* (series i.), and Prof. F. T. Palgrave's paper in *Cymmrodorion* (1891).

Vaughan, HERBERT, Roman Catholic archbishop of Westminster, was born at Gloucester on 15th April 1832, the eldest son of Lieut.-colonel Vaughan, of Courtfield, near Ross. Educated at Stonyhurst and on the Continent, he entered the priesthood, and in 1872 was consecrated Bishop of Salford, in 1892 succeeded Cardinal Manning as Archbishop of Westminster, himself shortly after being raised to the cardinalate. He is an eloquent preacher, the founder of St Joseph's College for foreign missions at Mill Hill, Hendon, and proprietor of the *Tablet* and the *Dublin Review.*

Vaughan, ROBERT, was born in 1795, in 1819 entered the ministry, and was in turn Independent minister at Worcester, Kensington, professor of

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History in the university of London, and president of the Lancashire Independent College, Manchester (1843–57). After his retirement he preached at Uxbridge, St John's Wood, and Torquay, where he died, June 15, 1868. He founded the *British Quarterly Review* in 1845, and edited it for twenty years, and was chairman of the Congregational Union in 1846.

Among his many books may here be named *Life of Wycliffe* (1828), *Causes of the Corruption of Christianity*, *History of England under the House of Stuart* (1840), and *Revolutions in History* (3 vols. 1859–63).

Vault, an arched roof, usually constructed of stone or brickwork. See GOTHIC ARCHITECTURE, Vol. V. p. 315.

Vauvenargues, LUC DE CLAPIERS, MARQUIS DE, a French writer of *Pensées*, born at Aix, near Marseilles, 6th August 1715, of ancient but impoverished provincial nobility, entered the army as lieutenant in the Regiment du Roi, 1733, and became known for his simple life and studious habits. In 1737 he wrote a treatise on *Free-will*, and began a correspondence with his cousin, the Marquis de Mirabeau—otherwise known as 'the Friend of Man.' Vauvenargues' health suffered from the hardships of campaigning, and in 1743 he left the service after bearing part in the defeat of Dettingen. With health and means hopelessly impaired, he retired to his native place, having vainly sought for diplomatic employment. In 1744 his health was further shaken by an attack of smallpox; on recovering he resolved to settle in Paris, where he became intimate with Marmontel and his set. The conditions of such a life, always embarrassed by bad health, did not allow of a high level of literary attainment. He obtained, however, the good opinion of still more important literary men, especially by a comparison between Corneille and Racine which he sent to Voltaire. In 1746 he published his *Introduction à la Connaissance de l'Esprit Humain*, with *Réflexions et Maximes* appended. The work was anonymous, but obtained commendation from Voltaire, who said that 'he knew of no book better suited to form a well-born, well-trained spirit.' Next year the author died. Vauvenargues never mastered the languages of Greece and Rome; never even formed a mature taste in the literature of his own country. Yet his 'Greek style' and 'neat justice' have been praised by Sainte-Beuve; and the 'Advice to a Young Man' which closes the *Réflexions* is a fine piece, full of noble character and subtle thought. Vauvenargues was pious, though liberal; and Voltaire continued to praise him after death had prematurely arrested his career. Less pungent than his prototype La Rochefoucauld, Vauvenargues seems to have gained upon him in the favour of posterity: he is an instance of the power of sympathy: and his goodness is a source of strength and even of a certain sort of greatness. Often trivial and bald, sometimes reaching only a truism or a shallow paradox, he yet arrests the attention of his reader, and endears himself to his heart. Close observation, suggestive, if hardly profound thought, insight into the fundamental conditions of morality have proved less effectual to this end than his inherent goodness of heart. His literary fortune is illustrated by his own saying: 'Les maximes des hommes décelent leurs cœurs.'

The chief editions are by Gilbert (2 vols. 1857) and Plon (3 vols. 1874). See Sainte-Beuve, *Causeries du Lundi*, vols. iii. and xiv.; also the monograph in 'Les Grands Écrivains Français,' by Maurice Paléologue (1890).

Vauxhall, a public garden in London, opened immediately after the Restoration (May 1660), and closed on 25th July 1859, the site being sold for building purposes. It was situated in Lambeth, opposite Millbank, and near the manor called Fulke's Hall (the residence of Falkes de Breauté, a follower of King John), from which is derived its name. Pepys, writing May 28, 1667, describes the garden and its entertainments as 'mighty devertising.' But the eating, drinking, dancing, and flirtation that continually went on there led also to much quarrelling and dissipation. The loose character of the amusements it afforded is freely sketched by the dramatists and novelists of the 18th century, and is again revived in Thackeray's *Vanity Fair*. In 1823 the total number of visitors was 133,279, and on the one night of 2d August 1833, 20,137 (both maximum figures).

Vavasour, or VALVASSOR, a term of feudal times, more in use in the continent of Europe than in England, employed somewhat loosely, and defined by Camden as the rank next below a baron. Its usual meaning was one who held his lands, not directly of the crown, but of one of the higher nobility. See FEUDALISM.

Vecellio. See TITIAN.

Vector, in Mathematics, is any directed straight line of definite length. It is conceived of most simply as a carrying or transference or step from any chosen point to that other point lying in the proper direction and at the proper distance. Take any three points ABC. Then it is evident that the operation of passing from A to C is equivalent to the successive operations of passing from A to B, and then from B to C. In other words, the *vector* AC is equal to the sum of the *vectors* AB and BC. Of course if we limit our consideration to lengths only this theorem does not hold. It is easy to see that two vectors cannot be equal unless they have the same length and the same direction. The opposite sides of a parallelogram are equal vectors. On the other hand, the radii of a sphere, although they are all of the same length, are different vectors. The fundamental law of vector addition, which has been given above, is illustrated by the law of combination of a great many important physical quantities, such as velocity, force, rotation, couple, and so on. These can all be represented by directed straight lines, and are called vector quantities (see COMPOSITION). Laws for the multiplication and division of vectors have been given by Hamilton (see QUATERNIONS) and partly by Grassmann.

For a discussion of the chief properties of vectors, see Maxwell's *Matter and Motion*, Clifford's *Kinematic*, Kelland and Tait's *Quaternions*.

Veda—from *vid*, 'to know,' hence 'knowledge, (sacred) science'—is the name of a body of religious writings which the Hindus believe to be divinely inspired. This body primarily consists of four collections (*saṃhitâ*) of hymns, detached verses, and sacrificial formulas—viz. the *Ṛigveda*, or Veda of praises or hymns; the *Sâmaveda*, or Veda of chants or tunes; the *Yajurveda*, or Veda of prayers; and the *Atharvaveda*, or Veda of the Atharvans—to each of which are attached certain theological prose-works, called *Brâhmaṇa*, and intended chiefly to elucidate the meaning and application of the sacred texts, especially from a sacrificial point of view. The first three Vedas are often referred to as the 'trayî vidyâ,' or threefold science; and they alone must originally have formed the sacred canon, whilst the fourth Veda, which is less archaic in language, was not recognised till a later period. The Saṃhitâs of the Sâmaveda and Yajurveda are of a purely sacrificial and professional character, being intended to serve as text-books for two of the four chief classes of priests—viz. the chanters (Udgâtar) and the offering priests (Adhvaryu) respectively; and the verses contained in them are to a large extent taken from the Ṛiksaṃhitâ, though not unfrequently with considerable textual variations. The Ṛiksaṃhitâ, on the other hand,

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though likewise assigned to a special class of priests—viz. the invokers (or sacrificers, Hotar), is not a sacrificial text-book in the same narrow sense of the word; but it has rather to be looked upon as a collection of all the sacred poetry which was within reach of the collectors, and seemed to them worthy of being preserved for devotional purposes. The hymns recited by the Hotar at the sacrifices were, however, drawn almost exclusively from this collection, the study of which was therefore especially incumbent on him. The fourth class of priests, the Brahmans, whose function it was to superintend the entire sacrificial performance, had not, and could not from the very nature of their office have, any special text-book assigned to them; and it was doubtless from mere theoretic considerations that the Atharvaveda came ultimately to be regarded as specially connected with the Brahman priest.

More or less closely connected with the Brâhmanas are two classes of works—viz. the *Âraṇyakas*, or forest treatises, so called from the recondite nature of their subjects, which it required an anchorite's seclusion to study adequately; and the *Upanishads*, or secret doctrine, treating of the nature of the Brahman, or supreme spirit. The gradual elaboration of the sacrificial system also at length gave rise to ceremonial manuals, composed in the form of strings of concise rules (sûtra). These *Kalpasûtras* usually consist of two parts—viz. *S'rautasûtras* and *Gṛihyasûtras*, dealing with the great Vedic sacrifices and the ordinary domestic offerings and ceremonies respectively. In course of time the oral transmission of the canonical scriptures led to more or less serious discrepancies, as regards both the order of arrangement and textual readings, which gave rise to different schools recognising different recensions (*s'âkhâ*, lit. 'branch') of the sacred texts. The number of such different versions was at one time very considerable, especially in the Sâmaveda and Yajurveda; but only a few of them have been preserved.

The *Ṛigveda-saṃhitâ* has come down to us in a single recension, that of the S'âkala school. It consists of 1028 hymns, composed in various metres, and arranged in ten books, or mandalas. Book i. is mainly made up of sixteen collections of hymns ascribed to as many poets belonging to different families. Books ii.–vii., on the other hand, are attributed each to a special family of Rishis or seers—viz. the Gṛitsamadas, Kus'ikas (or Vis'vâmitras), Vâmadevyas, Atris, Bharadvâjas, and Vasishthas respectively—whence they are usually called the family books. In the several collections of these seven books the hymns are arranged according to the deities to whom they are addressed—viz. Agni (god of fire), Indra (god of the sky), followed by minor deities. Book viii. consists mainly of hymns adapted for chanting, and for the most part belonging to the Kâṇva family of seers. Book ix. is made up exclusively of hymns addressed to Soma, the deified power of the intoxicating juice of the soma-plant, and used for recitation at the Soma-sacrifice (see SOMA). Book x., consisting like the first of 191 hymns, has the appearance of an appendage, containing for the most part hymns of later origin, though also doubtless including not a few genuine old hymns which had probably escaped the attention of the original collectors. The date at which the hymns were collected may be approximately fixed at 1000 B.C., while the composition of the earlier hymns would probably go back several centuries before that period. The Vedic Aryans, as pictured in the hymns of the Ṛik, were scattered in numerous clans over the Punjab and adjoining districts west of the Indus. Their religion was mainly a worship of the powers and phenomena of nature; the favourite deities being Indra, for ever battling with the demons of darkness and drought; Agni (ignis), the genial inmate of the human dwelling in the shape of the household fire; Ushas (aurora), the fair awakener of the daily life; Soma; and Varuṇa (*οὐρανος*), the stern and ever-wakeful guardian of the sacred ordinances.

There is an English translation of the Ṛiksaṃhitâ, based on the native traditional interpretation, by H. H. Wilson, completed by E. B. Cowell; another, in metre, by Ralph Griffith; the hymns to the Maruts, or storm-gods, by F. Max-Müller.

The *Brâhmaṇa* of this Veda has been handed down in two distinct versions differing considerably, especially in their arrangement of the common matter—viz. the *Aitareya-brâhmaṇa* (trans. by M. Haug) of the school of the Aitareyins; and the *Kaushîtaki* (or *S'ânkhâyana*)-*brâhmaṇa* of the Kaushîtakins. The work deals exclusively with the various forms of Soma-sacrifice, and the consecration of the king. Each of the two schools has also its own Âranyaka—the *Aitareyâraṇyaka* and *Kaushîtaki-âraṇyaka*—certain portions of which are styled Upanishads. Similarly there are two complete sets of ceremonial rules, or Kalpasûtras, ascribed to Âs'valâyana (? 4th or 5th century B.C.) and S'ânkhâyana respectively.

The *Sâmaveda-saṃhitâ* consists of two parts (or Archika), the first of which contains the (585) verses to which the several sâman-tunes are usually sung, whilst the second gives the text of the made-up chants in the order in which they are required in the sacrificial ritual. The tunes themselves, on the other hand, are given in four special tune-books, called *Gâna*, attached to the Saṃhitâ. The latter, consisting as it does mainly of detached verses taken from the Ṛiksaṃhitâ, has only a technical interest. The mode of chanting somewhat resembled the Gregorian or Plain chant. The *Brâhmaṇas* of this Veda have a special character of their own, inasmuch as they are not different versions, or editions, of the same traditional exegetic and legendary matter, but altogether distinct treatises, dealing chiefly with chants. Nine such works are hitherto known, the most important of which are the *Tâṇḍya-brâhmaṇa*, also called *Panchaviṃs'a*, consisting as it does 'of twenty-five chapters;' the *Shaḍviṃs'a-br.*, or 'twenty-sixth;' the *Chhândogya-br.*, including the Chhândogyopanishad (trans. Röer, F. Max-Müller); and the *Jaiminîya-* or *Talavakâra-br.*, of which the interesting Kena-upanishad (trans. Röer; F. Max Müller), on the nature of the Brahman, forms part. There are also several ceremonial Sûtra-works connected with this Veda, among which may be mentioned the S'rautasûtra of Lâṭyâyana and the Gṛihyasûtra of Gobhila.

The *Yajurveda* offers the spectacle of a complete schism, its teachers and followers dividing themselves into an older and a younger branch, or the Black and the White Yajurveda, so called from the form in which their canonical books were handed down. For whilst the scriptures of the older branch presented a somewhat confused appearance, caused by the constant intermingling of the sacrificial formulas (*yajus*) and the exegetic portions (*brâhmaṇa*), the younger school adopted the practice of the followers of the Ṛik by dividing their scriptures into a regular Saṃhitâ, or collection of sacrificial formulas, and a Brâhmaṇa. The older branch became again split up into numerous schools; four different recensions of their texts being so far known to us, the most important of which is the *Taittirîya-saṃhitâ*, with an appendix called *Taittirîya-brâhmaṇa*, though characterised by the same motley intermixture of textual and exegetic matter. There is further a *Taittirîyâraṇyaka*, part of which constitutes the *Taittirîyopanishad* (trans. Röer; F. Max-Müller). Of the

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Sûtra-works of the older schools several have come down to us, at least in part, the most complete being the *Âpastamba-Kalpasûtra*. Of the texts of the White Yagus—viz. the *Vâgasaneyi-saṃhitâ*, and the *S'atapatha-brâhmaṇa*, or Brâhmaṇa of a hundred paths (books i.–vii. trans. by J. Eggeling), which includes the *Brihadâraṇyaka*, the recensions of two different schools are so far known to us—viz. the Mâdhyandinas and Kâṇvas, both of which recognised a common set of ceremonial rules, the *S'rautasûtra* of *Kâtyâyana* and the *Kâtîya-Grihya-sûtra* of *Pâraskara*.

The *Atharvaveda-saṃhitâ* is a collection of hymns and spells which, in importance and interest, ranks next to the Ṛiksaṃhitâ. The two collections present two different aspects of the religious belief of the ancient Hindus. Whilst the Ṛik reflects a simple belief in divine powers who are, on the whole, well disposed toward the Aryan man, and whose favour the worshipper is confident of gaining by his song, the Atharvan, on the other hand, reveals a superstitious dread of a host of malevolent powers, the effects of whose ill-will man seeks to avert by means of incantations and magic practices. As the language of the Atharvan presents a more modern appearance than the main body of the Ṛik, the marked change in the religious spirit of the people may perhaps be due to contact and intermixture with non-Aryan tribes. It is not impossible, however, that superstitious rites of the kind favoured in the Atharvan had long been practised by the Aryan people, though they found no expression in the devotional lyrics approved by the priests. The Saṃhitâ, which is traditionally connected with the priestly families of the Atharvans and Angiras, is divided into twenty books, the last two of which are, however, later additions. The ordinary text of Northern India is usually ascribed to the S'aunaka school. A new recension lately discovered in Kashmir not only differs from it considerably in its arrangement, but also contains some new matter, amounting to about one-sixth of the whole. The Brâhmaṇa of this Veda, the *Gopatha* (or cow-path)-*brâhmaṇa*, containing cosmogonic speculations and explanations of certain sacrificial rites, is probably a comparatively modern work; whilst of the two ceremonial sûtras, the *Vaitâna* (or s'rauta)-*sûtra* and the *Kaus'ika-sûtra*, a manual of domestic rites, the latter is by far the more interesting. The Atharvaveda has also usually assigned to it a large number of *Upanishads*, amounting to considerably over a hundred. They are evidently of various ages, many of them coming down to very recent times.

See the article SANSKRIT; Max-Müller, *History of Ancient Sanskrit Literature*; J. Muir, *Original Sanskrit Texts*; W. D. Whitney, essay on Veda, in *Oriental and Linguistic Studies*.

Vedanta. See SANSKRIT, Vol. IX. p. 153.

Vedder, ELIHU, an American painter, was born at New York in 1836, and studied at Paris and in Italy, where he ultimately made his residence. His subjects are mostly ideal—'The Lair of the Sea-serpent,' 'Fisherman and Djin,' 'Death of Abel,' 'Greek Actor's Daughter,' 'Cumean Sibyl,' 'Nausicaa and her Companions.' He has also illustrated Edward FitzGerald's *'Omar Khayyám* (Boston, 1884).

Vedettes are mounted Sentinels (q.v.) in advance of the outposts of an army.

Veen. See VAN VEEN.

Vega. See GARCILASO DE LA VEGA.

Vega Carpio, LOPE FELIX DE, was born in 1562 at Madrid, but of a family that had its seat on the Vega of Carriedo, south of Santander. The story of Lope's life, as commonly told, is full of confusion. That he lost his parents early; was a student and graduate of Alcalá; a soldier in the Portuguese campaign of 1580, and in the Armada, 1588; secretary to the Duke of Alva, Marquis of Malpica, and Marquis of Sarria; had many amours, was twice married, and father of at least six children, three of them illegitimate; was banished from Madrid because of a quarrel, and lived two years at Valencia; took orders, became an officer of the Inquisition, and died at seventy-three a victim to hypochondria—all this is indisputable, but the order and relation of the facts are by no means clear. Too much reliance has been placed upon his friend and biographer, Perez de Montalvan, who suppresses everything touching his reputation, and, knowing him only in his ascetic days, and being forty years his junior, was not likely to hear much from him about his love-affairs and early adventures. Lope himself, too, increases the confusion by his obscurity and invariable practice of making himself out younger than he was in his reminiscences. Thus he has puzzled Schack and Ticknor by giving his age as fifteen when he fought against the Portuguese at Terceira, a thing he had no opportunity of doing until he was twenty. On Montalvan's authority it is said that on leaving Alcalá he attached himself to the Duke of Alva (i.e. the third duke, the Alva of history), at whose instance he wrote the pastoral romance of the *Arcadia*, that soon afterwards he married and was banished, and that grief on the death of his wife drove him to join the Armada. But his own words in the *Eclogue to Claudio* and in the *Dorotea* (Act V. sc. viii.) show that it was not the loss of a wife, but trouble with a mistress, Filis, *alias* Dorotea, that sent him to sea; and that his marriage came later; and abundant evidence, internal and external, proves that the *Arcadia* was written after the Armada, and not for Duke Ferdinand, but for his grandson Antonio, the fifth Duke of Alva. It is, in fact, the story, in a pompous, pastoral setting, of the young duke's matrimonial vacillations in 1589–90, the sober prose version of which may be found in Cabrera's *Felipe Segundo* (part ii.). It must have been soon after this that he married his first wife, Isabel de Urbina, and got into the scrape that drove him to Valencia, for both events are referred to in the *Romancero General*, in ballads written at the latest in 1593. He hints at a woman's revenge as the cause of the latter; but in a petition to the king in 1598 he specifies 'certain satires against a manager,' for which he was sentenced to ten years' banishment and suffered two, the remainder being remitted. The only issue of his marriage that we hear of was a daughter, Theodora, whom he calls 'the consolation of his exile.' The year of his wife's death is uncertain, but about 1600, apparently, he married Doña Juana de Guardio. Soon after marriage he had a *liaison* with one Doña Maria de Luxan, the fruit of which was two children born in 1605 and 1606, Marcela, who took the veil in 1621, and Lope, who was drowned at sea the same year. By his wife he had also a son and a daughter, Carlos, who died in childhood, and Feliciana, who survived him. In giving birth to the latter (1612) the mother died, and Lope, already a Familiar of the Inquisition, took orders, resolved, Montalvan says, to devote himself to the welfare of his soul; but three years later a woman, beautiful, brilliant, and 'mated with a clown,' crossed his path, and after a struggle he yielded to his destiny. Tenderness for his name has withheld the mass of his letters to his friend and patron the Duke of Sessa, but a few bearing on this episode were printed in 1876, and it was as well they were, for they dispose of some of the worst imputations against him—e.g. that of having been pander in the duke's amours, which is only

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true in so far that he drafted his love-letters. But they are evidence of deplorable moral laxity. He was no hypocrite: he had a conscience, and it troubled him sorely; but the opiates of the church enabled him to lay it to sleep, and as soon as it was silent he fell to sinning again. Out of his own mouth he is proved to have been a miserably weak man with passions too strong for him. A daughter born to him in 1617, to whom he was tenderly attached, as indeed he was to all his miscellaneous offspring, deserted him, it seems, in his old age, and his last years were darkened by sorrow as well as remorse. He took to practices of the severest asceticism, and, sinking at last into what Montalvan describes as a 'continued melancholy which of late has been called hypochondria,' he died, August 27, 1635. His funeral was more like a prince's than a poet's, and the largest and most illustrious concourse ever seen in Madrid followed his remains along the same street where Cervantes had been carried to his obscure grave on the shoulders of four friars; a contrast, yet not greater than that between the cheerful serenity of the one deathbed and the gloom that lay heavy upon the other. He died poor, but not because of his Castilian love of pomp and display, as Sismondi assumes. His large income from his dramas and other sources was all but wholly devoted to charity and church purposes. His tastes, wants, and habits were of the simplest; a little flower-garden a few yards square was his one luxury, and a few books and pictures all his worldly goods.

The mere list of Lope's works presents a picture of unparalleled mental activity from boyhood to old age. He wrote plays, he says, in his twelfth year, and certainly wrote some not much later, but his first work of any length was a characteristic attempt in twenty cantos to prove that his was the *miglior plettro* to which Ariosto left the completion of Angelica's story. It was written at sea in 1588, but not printed till 1602. The *Arcadia* was written, as book v. shows, before the Duke of Alva's marriage, July 1590, but he, no doubt, was not eager to see in print pre-nuptial vagaries, which had already, as Cabrera says, 'made a noise,' and it was kept back till 1598. The *Dragontea*, a shout of exultation in ten cantos over the death of the Dragon, Drake, the destroyer of Spanish naval supremacy, appeared at Valencia the same year, but a few months earlier, and was Lope's first publication with his name. But it was as a ballad-writer that he first made his mark. The 'Flores de Romances,' the little 'garlands' out of which the *Romancero General* was formed, had begun to come out at Valencia when he was there in 1590–92, and of the contributors of the Moorish and pastoral ballads in vogue 'Belardo' (his name in the *Arcadia*) was, we learn, the most esteemed. Of his miscellaneous works some, like those on St Isidro and his canonisation, and on the marriage of Philip III., are merely occasional, and others owe their escape from utter oblivion solely to his name. The more notable are the *Rimas* (1602), comprising the *Angelica*, 200 sonnets, and a reprint of the *Dragontea;* the *Peregrino en su Patria* (Seville, 1604), a romance on the model of *Theagenes and Chariclea*, with a preface giving his views on the drama, and a list of the 219 plays he had already produced; the *Jerusalen Conquistada* (1609), an epic in twenty books in competition with Tasso; the *Pastores de Belen* (1612), a religious pastoral; *Filomena* and *Circe* (1621–24), miscellanies in which he tried to rival the *Novelas* of Cervantes; the *Corona Tragica* (1627), an epic with Mary Stuart for heroine; the *Laurel de Apolo* (1630), a poem on the pattern of Cervantes' *Viage del Parnaso;* the *Rimas de Tome de Burguillos* (1634), a collection of his lighter verse, with the *Gatomaquia*, a mock-heroic. The most noteworthy of all is the *Dorotea* (1632), in form a prose drama, but obviously the story of his own early love-adventures from 1583 up to a little before the sailing of the Armada, with a prediction from an astrologer of his marriage, imprisonment, and banishment.

Originality, it will be seen, was not Lope's forte. He was fonder of following in the wake of others than of striking out a line of his own. He was always measuring himself against any one who had achieved success, and always unsuccessfully. All these works show the hand, not of a great artist, but of a consummate artificer. The merits of Lope's verse are undeniable. He was a master of easy, flowing, musical, graceful verse; but he rarely passes the frontier line between mere excellent verse and poetry, and never tarries long when he does. Once only he seems to write from his heart and not from his head, in the ballad on his first wife's grave, visited on a bright spring day when the trees were coming into leaf, the birds singing gaily, the lambs frisking round him, and all nature as usual unsympathetic with sorrow. These *obras sueltas*—detached works—of Lope's shine in fact in the reflected light of his dramatic renown. It is clear that though he had written plays he did not become a writer for the stage until after 1588. From his quarrel with a manager, it seems he had tried his hand at Madrid; but no doubt it was at Valencia, where it was more forward, that he served his apprenticeship to the drama. Not the least of his many gifts was his intuitive perception of the Spanish playgoer's tastes. He saw what his predecessors, Cueva, Virues, Argensola, Cervantes, all failed to see, that the public did not care for tragic emotion or development of character or passion; that what it wanted was excitement pure and simple, and that a drama that ignored a craving which had been utilised by the Inquisition, been the mainstay of chivalry romance, and had made the bull-fight a sacred institution, could never become a popular national drama. In the *New Art of Comedy-writing* and in the *Peregrino* he puts the case with a candour almost cynical. It is true, he says, that plays written in defiance of the rules of art are barbarous, but the public does not trouble itself about the unities, or the twenty-four hours rule, or inconsistencies, or improbabilities, and he who would be listened to must put away all restrictions that hamper him, and make it his business to give the public what it asks for, even if that be nonsense: he who pays the piper calls the tune. The great point was not to allow the excitement to flag for an instant, and to drop no hint of how the play was going to end; the *enredo*—not 'plot' but 'entanglement'—was all in all. Lope's qualifications for this were extraordinary. His invention was boundless. He could string striking situations and ingenious complications one after another without stop or stay, and keep the audience breathless and the stage in a bustle for three long acts, all without a sign of effort. Not less astonishing was his mastery of easy musical verse that charmed the ear and gave additional brilliancy to the dialogue. And then, long before one play had ceased to excite he was always ready with another as good or better. It is no wonder that Cervantes called him a prodigy of nature, or that he was idolised by the nation which for forty years he kept supplied with the stimulant it craved. Imagination or creative power need not be looked for in Lope's drama; they were not among his gifts, and would have been useless if they had been. His dramatis personæ, for the most part, have no more individuality or character than a batch of puppets. Don Luis of one play is only Don Lope of another in a different wig and doublet, declaiming rage, jealousy, or despair with precisely the same unchanging wooden

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countenance. In principle Cervantes was right in his strictures on Lope's drama, but on the practical question he was wrong, as is amply proved by the reception given to the plays of Alarcon, a dramatist in a sense in which neither Lope nor Calderon could claim the title. As regards his relations with Cervantes, Lope has not been fairly treated. The charge of malignity rests upon his disparagement of *Don Quixote* and its author in a private letter, and his silence in public as to the merits of the book. He would have been a marvel of magnanimity if he had liked either. Impartiality must allow that Cervantes was the aggressor. His attack was in the language of a courteous gentleman and an honest critic, but it was an attack all the same; and the sly hits at little vanities that accompanied it could not but be galling to a vain and sensitive man. As for the charge brought by Don Ramon Leon Mainez, that Lope was 'Avellaneda,' that rests on nothing at all, and evidence must be forthcoming before any one who knows human nature will believe that a gallant soldier who had fought in the Armada sneered at another for having been wounded at Lepanto.

Lope's plays have been elaborately classified by Schack, Hennig, and others, but for convenience they may be roughly divided into the historical or quasi-historical (including legendary and sacred dramas) and those that deal with everyday life. Of the latter the most characteristic in every way are the 'Comedias de capa y espada'—cloak and sword plays—a picturesque title that puts the principal figures before the eye. They are as a rule dramas of upper-class society, in which love, gallantry, jealousy, and above all the hyper-sensitive Spanish honour supply the necessary complications. The *Noche de San Juan*, one of Lope's very last plays, the *Maestro de Danzár*, one of his first, and the *Azero de Madrid*, the source clearly of Molière's *Médecin Malgré Lui*, are excellent specimens. It is not easy to make a selection of typical characteristic examples out of a repertory so vast and varied as Lope's, but his peculiarities and excellences as a dramatist may be studied with advantage in such plays as the *Perro del hortelano*, the *Desprecio agradecido*, the *Estrella de Sevilla*, the *Esclava de su Galan*, the *Premio del bien hablar;* and no student of Calderon should overlook the *Alcalde de Zalaméa*, which, if not better than Calderon's famous play, as Chorley thought it, is unquestionably the bold vigorous outline that left little more than filling in to be done by Calderon's hand, and is one more proof that later dramatists found Lope, as Fuseli said the painters found Blake, 'good to steal from.'

The number of Lope's plays is given by Montalvan as 1000, exclusive of 400 *autos;* but this is obviously excessive, as he wrote but few during the last two or three years of his life, and in 1632 the number is put at 1500 both by himself in the *Eclogue to Claudio* and by Montalvan in *Para Todos*. This is probably near the truth, as it agrees with the rate of production indicated by other statements. In 1603 he had written 230; in 1609, 483; in 1620, 900; and in 1624, 1070. Of these the very names of all but 608 according to Barrera, 680 according to Chorley, have been lost, in a great many cases nothing but the name has survived, and frequently one play is represented by two names. All necessary deductions made, we have about 440 plays and 40 *autos* in print or MS. Some have been printed singly or in general collections, but the greater number are to be found in the *Comedias de Lope de Vega*, a series of 25 volumes of which 9–21 were authorised by himself. A selection comprising about a fourth of the extant plays, edited by Hartzenbusch, fills 4 volumes of the *Biblioteca de Autores Españoles*. The non-dramatic works were collected and published at Madrid in 1776–79 in 21 handsome volumes; and a selection fills vol. xxxviii. of the *Bib. Aut. Esp.*

See also Ticknor's *Spanish Literature*, Schack's *Geschichte der dramatischen Literatur in Spanien*, Hennig's *Studien zu Lope de Vega*, Chorley's *Catalogo de Comedias y Autos de Lope de Vega*, Barrera's *Catalogo del Teatro Español*, Lord Holland's *Life of Lope de Vega*, and G. H. Lewes' *Spanish Drama*, an unpretending little book full of sound criticism. A complete edition of Lope's works, under the direction of the Spanish Academy, is in progress.

Vegetable. See PLANTS, BOTANY, BIOLOGY, GEOGRAPHICAL DISTRIBUTION, &c. For Vegetable Chemistry, see VEGETABLE PHYSIOLOGY; for Vegetable Marrow, see GOURD; and see also IVORY (VEGETABLE), and PARCHMENT.

Vegetable Kingdom. The general history of classifications of plants is given in the articles BOTANY and BIOLOGY, and the details of the great divisions will be found under ALGÆ, FUNGI, MOSSES, FERNS, GYMNOSPERMS, MONOCOTYLEDONS, DICOTYLEDONS. The student will find an excellent account of the older classifications of Linnæus, De Jussieu, De Candolle, Endlicher, and Eichler in Leunis' *Synopsis der Pflanzenkunde* (1883). Recent progress has in part been due to the influence of replacing long verbal descriptions by diagrams, introduced by De Candolle and greatly developed by Eichler in his *Blüthendiagramme*, which led to better classifications from a purely morphological standpoint. The effect of evolutionary ideas may be traced in Warming's *Haandbog i den systematiske Botanik* (German trans. Berlin, 1890). No quite satisfactory classification of plants has yet been constructed, nor indeed can one well be until a thoroughly evolutionary point of view is adopted.

The student may consult text-books such as Bentley's *Manual of Botany;* Henfrey's *Botany;* Asa Gray's *Botany;* Goebel's *Outlines of Classification and Special Morphology* (Oxford, 1887); Hooker's translation of Lemaout and Decaisne's *Botany;* Van Tieghem's *Traité de Botanique* (Paris, 1891); Kerner's *Pflanzenleben;* and for fuller information the great works—Bentham and Hooker's *Genera Plantarum*, Baillon's *Histoire des Plantes*, and Engler and Prantl's *Pflanzenfamilien*. For local plants he should consult the various floras, of which we may cite as typical Rabenhorst's *Deutsche Kryptogamen-Flora*. Of elaborate monographs, Saccardo's *Sylloge Fungorum* may be mentioned as typical and very complete.

Vegetable Physiology. The seasonal sequence of leaf, flower, fruit, and seed ever reminds us that plants live and change; and the cycle of farm or garden operations is correlated with this. The relation of these processes to plant development must be closely and carefully examined, and the manifestations of life seen as the resultant of many hidden internal actions. It is useful to begin by sowing some seeds and studying the conditions under which they grow best, and what changes constitute this growth, and on these germination experiences base a fuller investigation of the life-processes of the adult plant.

Germination (see SEED, SPORE, &c.).—The seed sown must be alive. The common test—that a living thing breathes—may be adopted. In many cases this Respiration (q.v., and see also below) can be shown by drawing the air surrounding the seeds through a tube containing lime-water, when the insoluble white carbonate of lime is formed by the union of carbon dioxide, CO_2, with lime. In some cases transpiration (see below) can be detected. Most seeds in temperate regions live a year at least, sometimes two or more. Where there is no winter, some seeds (as those of the coffee) must be planted almost at once. On the other hand, melon seeds have germinated when over forty years old. The young plant must be nourished by food stored around or within it, until such time as it can make its own food. These reserves (see ALBUMEN, SEED) are not directly assimilable by the embryo, but must first be digested by 'ferments' (see FERMENTATION, and below), which

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exist in necessary quantity only at a certain period of the seed's life. The reserves are often very dry, and must have a supply of moisture before digestion and assimilation are possible.

No motion of particles bringing this about can take place if the seed be frozen; so a minimum of heat—from 4° to 13° C.—is necessary, and germination is impossible at temperatures higher than 36° to 46° C., and is most active at 26° to 35°, varying according to the nature of the seed. Other external influences are of comparatively little importance. The visible results of germination are the appearance of root, seed-leaves, and shoot. The life-processes of the seed have all been intensified—breathing is more rapid, transpiration is marked, and sometimes enough heat is given out to let us feel and measure it—e.g. in malting. The seedling is very sensitive to all outside influences: it quickly droops in drought, shrivels up should the sun's heat be too great, and blackens if the nights be frosty. As the plant develops it becomes less influenced by environment, and soon begins to make its own food; but before discussing this special function of plants it is well to look at the life-processes common to all organisms.

Respiration (q.v.) is manifested by the intaking of oxygen, O, and the final liberation of carbon dioxide, CO_2, gas. Attempts to grow most plants without free O are failures; and the CO_2 can be precipitated as calcium or barium carbonate when drawn through lime or baryta water. The activity of respiration is best measured by the number of volumes of gas per unit mass taken in and given out in unit time under constant conditions. Thus comparative accounts of the rate of breathing of different plants and of different parts of plants may be obtained, as well as the relative intensity of respiration at different ages of organism and of organ. Succulent plants and very dry ones do not respire so energetically as rapidly growing grasses and annuals; and the young plant breathes very actively, whereas the hibernating bulb or seed respires most sluggishly. External influences have no great effect on respiration, which, however, is somewhat quickened by a rise of temperature up to that which kills the plant. For most plants in normal conditions the volume of oxygen taken in is approximately the same as that of CO_2 given out.

Most cells are not immediately asphyxiated if deprived of free oxygen, but take it from some of the simpler organic compounds they contain or that surround them—a leading product in many cases being Alcohol (q.v.; and see FERMENTATION). The yeast plant has been domesticated for this purpose, and other moulds and also many bacteria are able to prolong the process and convert large quantities of sugar into alcohol, or split up other substances into different constituents. Here the volume of CO_2 exhaled is greatly in excess of the O inhaled. The volume of O consumed is much greater than that of CO_2 liberated in other cases, such as that of the acetous ferment.

Transpiration.—The heat given off in respiration is partly used in evaporating water, ever present in organic substances. This vaporising of water is usually termed transpiration. It may be shown by placing a plant in a pot on one of the scales of a balance, and noticing that the weight lessens, although, as we shall see, a green plant in the light must be adding to its substance all this time. Accurate estimations of the volume of transpired water can be made by sealing the moist soil and the root of a plant in a glazed pot covered with a waterproof lid, placing this under a bell-jar, supplying the plant with water-free air, and measuring the change of weight of the drying tubes through which this air is sucked after passing through the bell-jar.

The amount of water vaporised is by no means constant. It varies with nature and age of plant, and part of plant, and with external conditions. Some seeds, especially oily ones, cannot be found to transpire, others can; young plants readily do so, and leaves more vigorously than roots or stems. Transpiration seems very analogous to evaporation, and is less marked in moist conditions, but it never ceases in saturated air as the latter does. It is said to be less than evaporation, because a plant killed and uninjured (by anæsthetics for instance) gives off more water vapour after death than before it; but the experiments are inconclusive. In fungi and other greenless plants the influence of light is noticeable to a slight extent, increasing transpiration. But if a green plant be kept in the light there is a much stronger marked maximum when the sun is brightest. When this plant is kept under a sealed bell-glass for some time no CO_2 but an excess of O is found. If this last change be prevented by ether, respiration being unaffected, then the amount of water vaporised is increased. All these phenomena are closely related, and will be discussed below. The leaf is the green organ *par excellence*, and by its construction, its distribution on the plant, and its position with the surface normal to the sun's rays (except when these are excessive) it can arrest the greatest possible number of radiations (see LEAF).

The maturing leaf has two transpiration maxima. The first and greatest is when the leaf is very young and every surface-cell can transpire freely. Gradually a cuticle develops which may be coated with wax in addition, and then the transpired water passes by the stomata. The crescentic bounding cells of these openings are specialised, and contain Chlorophyll (q.v.), which, absorbing radiations, sets up activities synchronously with those of other green tissue of the leaf, and modifies the contents of these guard cells, so that they swell and open the stomata to their widest when the other green cells are most active. The second transpiration maximum occurs when most stomata are developed.

'Assimilation' and 'Chlorovaporisation.'—When a plant grown in the dark is brought into the light it first turns green, and then begins its new functions. The yellow etiolin stops certain ether waves which transform it into green Chlorophyll (q.v.). The spectrum of chlorophyll shows absorption bands in the red and violet, with less marked ones in the yellow. These waves move the molecules of plastic matter (protoplasm, solids, and solutions) associated with this chlorophyll, so that CO_2 is taken up and O is ultimately set free. This 'assimilation' is the reverse of respiration, a deoxidising process, an unburning where the sun's rays supply the needed energy. It often masks the breathing, and early physiologists were led to conclude that green plants respire in the reverse sense to animals. The volume of O given off is approximately the same as that of CO_2 taken in. Naturally optimum conditions of light promote optimum 'assimilation,' and the minimum occurs at night; but too bright light is injurious. Heat, up to 30° C. at least, increases it, and any optimum must be above this. A young leaf 'assimilates' more vigorously than an old one. The increase of transpiration when a green plant is in the light is probably due to all the energy arrested by the chlorophyll not being spent in 'assimilation,' but in part vaporising water; and this seems probable not only because more water is transpired when assimilation is inhibited by anæsthetics, while respiration is unaffected, but it is found that the blue and violet rays absorbed are more efficient in transpiration, while the red ones are most active in assimilation. M. van Tieghem has termed the transpiration, which is a function

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of chlorophyllic activity, *chlorovaporisation*, and others *transpiration chlorophyllième*. Chlorovaporisation is a useful term when it is necessary to distinguish between it and the transpiration due to protoplasmic activity.

Absorption.—Plants living in water have all their epidermal cells absorptive, and need no elaborate water conducting system. Land-plants must either extract the water from the air, or from the soil, or from both. Experiment shows that the Roots (q.v.) are the active absorbers, and the fine root-hairs near the tip of the roots the special organs concerned in this. These absorbing hairs, as they are best termed, are drawn-out epidermal cells with walls of Cellulose (q.v.), differing from that of most cells in being more readily permeated by water, inside which is a lining layer of Protoplasm (q.v.). This double layered cylindrical bag is filled with cell-sap.

The contact between these hairs and the grains of soil is very close, and a film of water coating their outside is continuous with that adhering to the particles of soil. The sap is more viscid than this mineral water outside, and so we have a living cell acting as a complex dialyser (see OSMOSE)—colloid cell-sap, crystalloid soil water, with protoplasm membrane supported by permeable cellulose skeleton work between. We have thus the conditions necessary for a flow of mineral water into the plant (any outflow being very small, although when acid aiding in the decomposition of the soil), which is continuous as long as these conditions remain constant. The cell-sap made less colloid by this influx of water is crystalloid compared to that of the inner cell, and the current accordingly flows inwards. Yet this is but the crudest approximation to a full explanation, for not only are the variations of the cell-sap's quality due to this dilution to be considered, but also those due to protoplasmic activity, and in addition the fact that the osmotic properties of the protoplasmic membrane itself are ever being modified by its continual oxidation and deoxidation.

Movements of Water.—In water-plants and those living in damp conditions, as well as in low-growing plants, osmose is the main agent. We need not imagine a long series of cells, each with its sap more colloidal than that of the next in order; for even in the laboratory the reversing of a membrane sometimes alters the direction of the current, and the plant membrane is very complex in structure, as well as constantly changing. It is difficult to set a limit to the influence of osmotic action.

Experiments making plants absorb tinted water show that it passes up the wood (xylem) part of bundles (see STEM), as may also be proved by noticing that only when the young wood has been incised all round do the leaves wither, and even hollowing out old wood does not induce drooping. Conifers have true vessels only in first-formed wood; hence any satisfactory explanation must not lay too much stress on capillarity, which would account for a rise of a few feet at most. Much stress has been laid on the porosity of the cell-walls and their permeability by water, and Sachs in his 'imbibition theory' has emphasised the mobility of this water, and believes he can explain the phenomena by its aid. The transpiration of water helps to raise water owing to pressure differences resulting from it, and these may be increased by the bubbles of air in the vessels or fibres losing their oxygen to respiring cells, the CO_2 given off being dissolved in the water. But pressure differences can account for no more than a few yards of rise.

The pressure from below at some periods of the year is very considerable, as Stephen Hales showed in his classical experiments on 'root-pressure,' when the watery sap was forced up a tube tightly fastened to the end of a cut stem. This is most noticeable in spring, and in part at least is a function of temperature, for a slight heating of the soil will sometimes make an experiment work more rapidly. This 'root-pressure' gives rise to 'bleeding' when the sap is forced out at buds in spring, and to 'dew' when exuded along the edge of a Lady's Mantle or other leaf. This exudation occurs from stomata in grasses, &c., and from special organs in saxifrages, balsams, &c. (called water-pores or stomata). Should the water have passed through a sugar-laden tissue it becomes nectar, and the organ a nectary. Some plants show an excessive development of water-pores and nectaries, and may be specially modified so that the exuded sap may be retained—e.g. the pitcher-plant (see INSECTIVOROUS PLANTS).

Metabolism (q.v., and see PROTOPLASM).—We have seen how green leaves are supplied with gases, water, and dissolved salts, and how they can trap special ether waves. The active energy of these waves is used to transmute the simple inorganic compounds into complex organic ones, which in the process of respiration are reduced to simpler substances again, and the potential energy transformed into kinetic. These metabolic changes take place in living cells full of intense activities. Currents course through the protoplasm and cell-sap in every direction and between the cells, which are also united by strands of protoplasm. The gases used and given off in respiration and 'assimilation' are floated in and out, and each protoplasm particle burned or unburned is the centre of an area of disturbance. Pure protoplasm is influenced equally by all rays: that associated with chlorophyll is affected by certain red and violet rays in particular. These, especially the red ones, bring about the dissociation of the elements of the CO_2, the assimilation of the C, and the excretion of the O. But carbon is not found isolated in the plant. The simplest carbon compound found in a green leaf after a few minutes' exposure to light is starch. Remembering that the same volumes of CO_2 are absorbed as of O excreted, we may write a chemical equation expressing results though not processes: $6CO_2 + 5H_2O = C_6H_{10}O_5 + 6O_2$. But we suspect that starch has had a more complex life-history, and that the first-formed organic compound is probably simpler, though very difficult to detect. Probably formic aldehyde is the product, and again the first and last chemical conditions may be written $CO_2 + H_2O = CH_2O + O_2$. From this higher compounds of C, H, and O may be formed.

Since the synthetic process is hidden from us, it will be best to give an idea of the gradual increase of complexity of the compounds found in plants. With nitrogen added to carbohydrates, Amides (q.v.) are formed, and when S and P are combined with these, the Proteids (q.v.). Protoplasm may be either a peculiar unstable arrangement of proteid molecules or a collection of many compounds in a similar unstable condition, so that the wandering oxygen molecules coming in contact with them explosively seize hold on some of the C, and completely unite with it in the most stable way. The protoplasm is constantly oxidising to be deoxidised again, burning to unburn. Irritable and unstable, it is formed to be destroyed, and recomposes only to be once more decomposed.

The result of this burning of protoplasm is either to form proteids, which may become protoplasm again or decompose into simpler compounds; or else to form a combination of compounds—proteids, carbohydrates, &c., which wholly or in part may form new protoplasm, be reduced, or remain in their new form. This may be conveniently summarised in fig. 1, A. The contrast between protoplasmic and

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chlorophyllic processes is shown in fig. 1, B. It is very difficult to discover whether a compound is a synthetic or a decomposition product; and it is just as hard to obtain some substances at all, since they are transferred to another cell, or transformed to another shape almost as soon as they are formed.

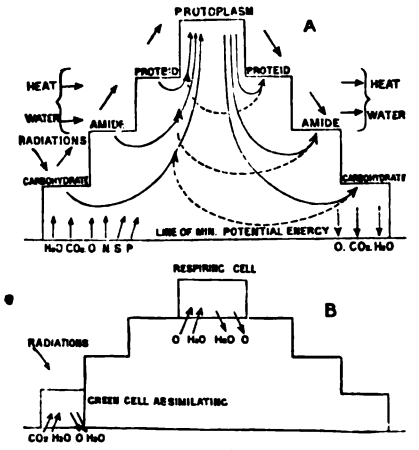

Fig. 1.

Other substances, however, may be stable for a long time. Any matter used to form protoplasm is called a food or reserve, and what is not utilised in this way is a waste. Both may be temporary or last for a considerable time. The same substance may be both a temporary and a seasonal reserve; for instance, starch found in green leaves during the day disappears at night; and starch is the main reserve in many seeds, tubers, &c.

The matter elaborated in the leaves is conveyed to growing and storing organs. Many constituents of elaborated matter cannot be transferred as they are, but must be changed to soluble substances, capable of passing through the cell membranes. This is effected by digestives, often called 'soluble ferments' (see FERMENTATION), which are found in all living cells. Insoluble starch is acted on by diastase, and changed to a cane sugar, which in turn is 'inverted' to soluble glucose; insoluble proteids are changed to soluble peptones by pepsine, &c. This soluble matter is transported by bast cells (see STEM), as is shown by peeling the bark off a tree, when growth takes place above the ringed part alone. A chain of living cells may osmotically conduct this elaborated sap, while the sieve vessels of the bast are active according to some, or according to others may be storehouses supplying food to the actively growing and dividing embryonic tissues (cambium) rather than conductors. Some wastes are at once excreted—e.g. O, CO_2, H_2O; some are secreted, and others are deposited in aggregates or crystals. Some so-called wastes are used again, and really are seasonal reserves. Many wastes are of great use in industry and medicine (see PHARMACY, NARCOTICS, GUM, RESINS, &c.). The odours and colours of plants are probably wastes (chlorophyll itself is sometimes thus classified).

Composition of Plants.—The plant uses O in respiring and CO_2 in assimilating, both of which come from the air. Water and the salts dissolved in it supply the other elements which are absorbed by the roots. All substances washed out of the soil are not used by the plant, but cease to enter when its lower cells become saturated; whereas the constant assimilation of any useful salt makes it be constantly absorbed. Some plants use more of one substance than of another, and a soil soon becomes poor if the same crops be constantly grown on it. Thus we need to have Rotation of Crops (q.v.) and also fertilisers (see MANURE). Plants may be grown in clean sand, and watered with nourishing solutions. But soil is not essential (witness hyacinth culture in our rooms), provided the roots are properly protected, supported, and supplied with water and the necessary minerals. An excellent solution for watering or growing plants is the following 'normal culture solution:' Dissolve 1 gramme nitrate of potash, ½ gramme sulphate of magnesia, ½ gramme sulphate of lime, and ½ gramme common salt in 1 litre of distilled water, and add a trace of phosphate of lime and of any ferrous salt.

The results of growing a plant in this normal culture solution are very satisfactory if external conditions are kept favourable; and when these latter are the same for all plants an excellent comparison of the effects of the lack of each of the compounds may be obtained, as is shown in fig. 2. The plant's needs regarding matter may be accurately determined by analysing all the gases given

Fig. 2.—Maize Plants grown under similar conditions, except that the roots were in different nutritive solutions, and that one plant was kept in darkness:
1, maize plant grown in 'normal culture solution' (see above); 2 had no sulphate of magnesia; 3 had no common salt; 4 had no sulphate of lime; 5 had no phosphate of lime; 6 had no nitrate of potash; 7 had no iron, and has become chlorotic; 8 was grown in distilled water; 9 was grown in normal solution, but in the dark.

off during life, and on combustion at death, and all the ashes that are left. The most important elements are C, O, H, N, S, P, and other essential ones are Ca, K, Na, Mg, Cl, and Fe.

Growth.—After germination the root of the young seedling spirally winds its way down among the particles of the soil, turning away from them with its sensitive tip, seeking out the moister parts. Behind the tip it clasps anything it touches and thus anchors itself. As it grows older it contracts, making this anchorage securer. The shoot, often with arched head, shoulders its way upwards towards the light, twisting round more or less as it rises. Root and shoot grow in thickness as well as in length (see ROOT, STEM). The curves and movements of growing parts are discussed under PLANTS (MOVEMENTS OF). The rate of growth varies very greatly. Bamboos are said to lengthen 10 inches in twenty-four hours. Our cereal crops (36–60 inches high) ripen about twenty weeks after the sowing of the seed, and some trees are hundreds of years old. Growth is most active in spring, and elongation is greater at night than by day, and indeed varies from hour to hour—the

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Victoria regia leaf, according to Drude's experiments, lengthening 99·4 mm. between 11 P.M. and midnight, and 127·9 mm. between 12 and 1 A.M. The greatest elongation takes place near the tip both of root and of shoot, within the last few millimetres in the former, on the last few centimetres in the latter. Fig. 3 represents the lengthening of equal divisions of a bean root after twenty-four hours' growth.

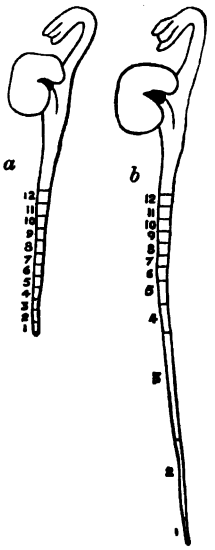

Fig. 3.
a, bean root divided into equal divisions; *b*, same root 24 hours later.

In rapid-growing parts respiration is naturally very active and transpiration stimulated; but it must be noted that the maxima of elongation and of transpiration do not coincide. Growth may occur below freezing-point, but in some plants none takes place below 10° C. or 15° C.; the best temperature varies from 20° to 36° C., and the maximum from 36° to about 50°, but plants are found growing in warm springs hotter than this. Light retards growth. A certain amount of water is essential to its occurrence. The matter used for the permanent changes we call growth comes from the excess of it elaborated over that used to repair waste, and the energy from the heat given off in respiration. It is necessary to examine what changes constitute this growth more closely; but, unfortunately, a satisfactory mechanical explanation seems scarcely possible.

It is necessary to imagine all the stir and change going on in the Cell (q.v.). The protoplasm grows by new organic matter formed by the chlorophyll grains being digested and assimilated. At the limit of growth cell-division occurs (see CELL, REPRODUCTION). After a cell has ceased dividing, the mass of its protoplasm is probably not greatly increased, but vacuoles appear in it, and as the cell grows older and elongates the protoplasm finally forms a membrane bounding one large sap vacuole and lining the cell-wall. The protoplasm has been rapidly adding to the cell-wall, and at last the wall assumes its final shape and markings. The elongation is due to the distension (*turgor*) of the cell by accumulated water. When a plant is rapidly transpiring (for instance a green plant in sunlight) the cells are not so likely to become turgescent. This is one cause at least of the lengthening being greatest by night, and it is well to emphasise that it is elongation that is then a maximum, and not necessarily the substantial increase which makes it permanent. When the wall is stretched in this way new cellulose can most readily be added. The cellulose may be deposited as such, or precipitated from some compound the rest of whose constituents are soluble. The unit may be the cellulose molecule, or a more complex one formed of an intimate union of several molecules (micellæ of Nägeli).

There are several theories as to the way in which the cellulose in any of the conditions just mentioned may be deposited. It may be plastered on inside of the wall (apposition theory), or the protoplasm may penetrate the cellulose wall and there lay down new matter, or the cellulose may be floated into position between old particles (intussusception). The transformation of cellulose into wood (lignin), or cork (suber), or gum (mucilage) may be explained most readily by one of the two latter hypotheses. The constant passage of cell-sap, and the permeability of the cell-wall (unless corky or gummy) must never be forgotten.

Movement in Plants.—The constant currents in cell-sap and protoplasm may be co-ordinated so that the whole contents are caused to glide round and round the cell (Elodea), or stream from side to centre, and from the nucleus back to the wall again (stamen hairs, Tradescantia). Sometimes this affects the whole organism, which may creep along like an amœba (Myxomycetes) or slowly swing to and fro (oscillatoria); or may be concentrated in one special part of the organism (cilium) whose rapid movements transport the plant from place to place (Volvox, zoospores). The sleep of plants may be explained as a partial periodic movement of plants, and classed among these natural movements. A number of motions are to be seen when a plant is specially stimulated, and these movements of irritability are discussed under PLANTS (MOVEMENTS OF).

Habits of Plants.—The simplest plants live in water, but other forms exist underground (Truffles, q.v.), while some can live in sugar (Yeast, q.v.) or in oil. The majority, however, are fixed to the soil and spread their expansions in the air. Some simply scramble along the ground (Brambles, q.v.), some keep erect, and others twine and climb up their stronger neighbours or other support to reach the light. Plants may live on decaying matter (Saprophytes, q.v.), or on other living plants (Parasites, q.v.): many associate with other plants or animals, each mutually helping the other (Symbiosis, q.v., or Consortism).

Reproduction.—At the limit of growth cell-division occurs; and sometimes special cells are cut off which either separately or after union with another cell are capable of reproducing the plant (see REPRODUCTION, FERTILISATION, &c.).

LITERATURE.—The works of Stephen Hales, Ingen Housz, Sénébier, De Saussure, De Candolle, Hofmeister, Boussingault may be consulted. The best books in English are Vines's *Physiology of Plants* (Cambridge, 1886), Sachs's *Lectures on the Physiology of Plants*, translated by Marshall Ward (Oxford), Goodale's *Physiological Botany* (Macmillan, 1890), and an excellent introductory book is Master's *Plant Life* ('Life on Farm' series). For experimental work Detmer's *Pflanzenphysiologische-practicum* (1888) is very useful. The physiological chapters in Van Tieghem's *Traité de Botanique* (Paris, 1891) may be consulted, as should be Pfeffer's *Pflanzenphysiologie*, and Frank's *Lehrbuch der Botanik*, Band i. (Leip. 1892).

Vegetarianism is popularly defined as the practice of eating foods obtained from the vegetable kingdom exclusively, and abstaining from all foods obtained from the animal kingdom. This is an approximately correct definition of what was meant by the word when the Vegetarian Society was founded in 1847. It was not long, however, before it was discovered that there was as great a need of discrimination in the use of the various products of the vegetable kingdom as there was cause to abjure the use of flesh. Vegetables are not all equally wholesome, some are absolutely poisonous. There is a great difference between the stalks and leaves and the seeds of plants. Cooked and uncooked foods differ greatly. The study of food leads to the study of equally important laws. Eggs, milk, cheese, butter (animal *products*) differ from the carcasses of slaughtered animals. Many of the arguments against the use of flesh do not apply to the use of fish. These and similar questions arose, and so sects sprang up. Some ate fish; some were called Vems (eating Vegetables, Eggs, and Milk); some were *strict* vegetarians or Vegs (excluding all

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animal products); some took up the Edenic diet (excluding all cooked food); some, though using cooked food, excluded cereals; some adopted a theory of a specific vitality in uncooked fruits, grains, nuts, and pulses, specifically adapted to the development of man on his four planes of body, mind, soul, and spirit. Out of this clash of conflicting ideas there gradually grew up in the London Society a symmetrical theory which has widened the basis of vegetarianism (Neo-vegetarianism). It holds that nature is governed by universal law; that health, happiness, and life are normal, and disease, misery, death abnormal; that man has power to regain the normal by obedience to the laws of nature (the abnormal being the result of inherited or personal disobedience); and that vegetarianism is coincident with obedience to these laws.

In strictness, therefore, no one is yet entitled to the name of vegetarian, but since it is believed that the eating of flesh is antagonistic to progress on so many grounds, and that reform in food is the basis of all individual reform, the renunciation of flesh in whole or in part is made the test question of vegetarianism, leaving the positive question of what articles in the vegetable kingdom constitute man's proper food to be one of the branches of further study. In support of abstinence from flesh the following ten claims are made: I. Physiology proves man to be closely akin to the frugivorous ape and essentially different from the carnivora, herbivora, or omnivora. But it is objected that man has canine teeth, and his intestines of mid length between the herbivora and carnivora show that he should partake of the food of both. To this the reply is that canine teeth are found in apes also; and the mean length of his intestines proves rather that he is fit for *neither* than for *both* forms of food, for grasses need long intestines which he has not got, and flesh needs to be passed away very rapidly through intestines shorter than man's, to prevent putrefaction. Physiologically and anatomically man can scarcely be differentiated from the higher apes. II. Embryology shows that to be a permanent differentiation of type which comparative anatomy shows to be actually different: the typical herbivora being placentally non-deciduate, the carnivora zonary deciduate, and apes and men discoidally deciduate. III. Chemistry proves that all elements for perfect nutrition in assimilable forms are found in a proper vegetarian dietary. It is objected that (*a*) an enormous bulk must be consumed to get the requisite nutriment; (*b*) flesh is food ready prepared by another animal, and so requires less vital strain to assimilate it than vegetable food. It is replied that (*a*) increased bulk is not necessary—e.g. of flesh alone it would be necessary to eat 96 oz. per day to get sufficient carbon; of bread alone, 64 oz. to get enough proteids; of mixed flesh and bread, 42·3 oz. (34·5 oz. bread and 7·8 oz. beef) would suffice; similarly 34·6 oz. of a mixture of 9·5 oz. lentils and 25·1 oz. of bread, or 24·1 oz. of almonds and raisins, would give the same result; (*b*) animal cells are not absorbed as cells, but must be broken down and converted to chyle before absorption, so that assimilableness varies as much between different sorts of flesh as between flesh and non-flesh foods. Thus pork takes, raw, 3 hours; well roasted, 5½ hours; beans, 3½ hours; beef, raw, 2 hours; well boiled, 2¾ to 3 hours; well roasted, 3½ to 4 hours; rice, boiled, 1 hour; fresh-baked bread, 3½ hours to digest. IV. Flesh as sold is diseased to a very high percentage by diseases communicable to man, which the purchaser is quite unable to detect. V. Higher instincts revolt against taking life, and the repression of these higher instincts prevents evolution of the higher man; while the relegation of the function of slaughtering to others is the unjust perpetuation of a degraded class to be an ever-constant source of danger to the stability of the morality of the community for the sake of supplying the luxurious demands of an artificial appetite. The objection made is that butchers are often kind and gentle, and that other occupations produce types of men as low as slaughtermen. VI. Unnecessary destruction of life is immoral. Objections are made—(*a*) that it begs the question to say that flesh food is unnecessary; (*b*) the land would be overrun if the animals were allowed to breed unhindered; (*c*) is it not more merciful to breed, tend, feed, and painlessly kill, than allow the animals to battle for existence and then die of hunger or fall a prey to the carnivora? The reply to these difficulties is—(*a*) physiology and chemistry prove flesh to be unnecessary; (*b*) the balance of nature prevents overrunning—e.g. is any new land when discovered overrun with animals, although they have had countless ages in which to propagate unhindered by man's interference? (*c*) the problem presented is hypothetical, for in reality the cruelties inflicted by man on the animal world are appalling, and for these cruelties the habit of flesh-eating is to a great extent responsible. VII. It is economically superior—for 1·281 lb. of oatmeal at a cost of 3d. will supply power to raise 140 lb. to the height of 10,000 feet, while of beef fat it would take ·555 lb. at a cost of 4½d., or of beef lean 3·532 lb. at a cost of 3s. 6½d. On the other hand it is said that if *all* were to adopt it it would simply mean an all round depreciation of wages by a reduction of the subsistence minimum. VIII. Physical strength increases, as proved by the usually superior physique of peasants to that of middle classes; Arab porters, Indian runners, and Scotch and Irish peasants are especially pointed out as physically above the average, while the frugivorous gorilla is noted for enormous strength. But it is objected that (*a*) men who are so fed improve when flesh is added to their diet; (*b*) many Hindus are puny and staminally weak. It is replied that (*a*) they appear to improve because flesh is a stimulant, and so transforms latent energy into manifest force; (*b*) it is not claimed that a diet chiefly composed of rice is the best, while the fact that many fine races do live without flesh proves that under such conditions at any rate it is not a necessity; and immediately the non-necessity is admitted the whole weight of the moral argument enters the scale against the habit. IX. Whereas 12 acres of land, if used for the rearing of cattle for slaughter, will maintain one man feeding on the flesh produced, the same area under wheat will maintain twenty-three, and on a mixed crop of fruit, pulse, grain, and vegetables a still higher number. The objection here is that much land is suitable for nothing else but, e.g., sheep runs. By the vegetarian this may be granted, but the assertion does not apply to the thousands of acres of valuable horticultural land now under grass. X. It is claimed that horticulture, and especially *petite culture*, would employ an enormously greater amount of labour than does stock-raising, and so tend to afford a counter current to the present townward drift and to congested labour centres.

Vegetarianism has spread so extensively that in addition to its pledged adherents it has a still greater number who practise abstinence from flesh to a greater or lesser degree in obedience to medical advice, for the curing or relieving of disorders of digestion, gout, and rheumatism. The Catholic Church enjoins abstinence from flesh during Lent, and on some other days during the year. Many religious orders (e.g. the

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Trappists) abstain wholly from flesh. Brahmins also abstain from flesh and eggs. The Vegetarian Federal Union was formed in 1889. Its offices are at the Memorial Hall, Farringdon Street, E.C. To it are affiliated the Vegetarian Society, the London Vegetarian Society, eighteen other English societies, and those of America, Germany, and Australia. An international congress was held at Cologne in 1889, in London in 1890. There are now vegetarian restaurants in many large towns.

The chief publications are *The Vegetarian* (weekly, Lond.); *The Vegetarian Messenger* (monthly, Manchester); *Food, Home, and Garden* (monthly, Phila.); *Der Vegetarier* (bi-monthly, Berl.); *Die Neue Heilkunst* (bi-monthly, Berl.). See John Smith, *Fruits and Farinacea;* Alcott, *Vegetable Diet;* Professor Francis W. Newman, *Essays on Diet;* Howard Williams, *Ethics of Diet*—all obtainable from the Veg. Federal Union; also Springer, *Wegweiser durch die Veg. Litteratur* (2d ed. 1880).

Vegetius (in full, Flavius Vegetius Renatus), a Roman author who about 375 A.D. wrote the famous *Epitome Institutionum Rei Militaris*, mainly extracted from other authors, which during the middle ages was a supreme authority on warfare.

Vehmgerichte (also spelt *Femgerichte*, or simply *Vehme*, *Fehme*), dread tribunals in Germany during the middle ages, empowered by the emperor to try cases in which the penalty was death, and to execute the punishment on the guilty. They were doubtless based on ancient Germanic methods of tribal justice, though the tradition refers their institution to Charlemagne. It was in Westphalia they were especially powerful, and this is explained by the fact that, whereas in other German lands the ruling princes assumed to themselves all capital jurisdiction, in Westphalia there were for long no territorial potentates strong enough to take over the authorities originally peculiar to the emperor alone and those specially commissioned by him. The anarchical condition of Germany favoured the extension of the Vehmgerichte; and in the 14th century the solemnly initiated members of this tribunal, called *Schöffen* or *Freischöffen*, were found scattered all over Germany. Wherever he lived, the Schöffe could be tried capitally only by the Westphalian court; princes found it convenient to be initiated themselves and choose *Schöffen* for their advisers, and free cities aimed to have their councillors associates of this august body. Any free German born in wedlock might be admitted with solemn formalities, after taking an awful oath to be faithful to the duties and privileges of the order, on pain of an ignominious and specially painful death. The chief of the society, the *Oberstuhlherr*, was the emperor's representative, namely the Archbishop of Cologne as Duke of Westphalia. The *Stuhlherr* was the chief at any given Stuhl or seat of justice, of which the most famous was in the market-place of Dortmund. Officers or *Freigrafen* were named by the Stuhlherren. Any free man might attend the meetings, always held by daylight in the open air, unless the court specially resolved itself into a secret tribunal for the time being; and even then the number of members in important cases took away any real 'secrecy' from the trials. Thus eighteen Freigrafen and 800 Freischöffen took part in the trial of Duke Henry of Bavaria in 1434. The places and times of meeting were perfectly known to all who cared to know. The summons was not delivered personally but usually fastened to the door of the accused. The mode of trial—by accusation and pleading in defence—was the same as in other German courts; and for centuries the power of the Vehme seems to have been used for the best ends, with a full feeling of responsibility and love of justice. Torture was never had recourse to: the convicted prisoner was usually executed at once, or whenever he was found, by being hanged on the nearest tree, a dagger with the device of the society, the mysterious letters S.S.G.G. (whose meaning is unknown), being fixed beside the corpse to show by whose decree the man died. Gradually abuses crept in; the dread powers were used in personal feuds; and the minor princes became more and more jealous. Maximilian subjected the Vehme to very stringent regulations; already in the 16th century they were strictly confined to Westphalia, and gradually subordinated even there to the ordinary courts. They continued to exist, maintaining the ancient formalities, though now bereft of power and little better than a laughing-stock, till they were finally dissolved in 1811 by Jerome Bonaparte. The last Schöffe died in 1835.

There is an extensive literature on the subject, a series of monographs having corrected many picturesque but erroneous conceptions of the once so formidable secret tribunal. Amongst them are those by Berck (1814), Usener (1832), Essellen (1877), Wächter (1882), Lindner (1887), and Thudichum (1889). There is a graphic account of the Vehme in Immermann's *Münchhausen;* see also Scott's *Anne of Geierstein* and the introduction to the same. The etymology of the name in its various forms has been much debated, but is quite obscure.

Veii, an ancient city of Etruria (q.v.), in early times the formidable rival of Rome, supposed to have been at *Isola Farnese*, 12 miles from Rome. It waged fourteen distinct wars with Rome—an almost incessant warfare down to its capture after a ten years' siege by Camillus (396 B.C.).

Veiled Prophet. See MOKANNA.

Veins, in Anatomy, if we except the pulmonary, the portal, and the umbilical veins, are the vessels which carry back venous blood from the capillaries, and, enlarging as they proceed, finally pour it through the ascending and descending *venæ cavæ* into the right auricle of the heart; see CIRCULATION. Their coats are similar to those of the arteries, but much thinner, and may be even transparent. They are, however, of considerable strength. The *internal coat* consists of an epithelial layer, supported on several laminæ of longitudinal elastic fibres. The *middle* or *contractile coat* consists of numerous alternating layers of muscular and elastic fibres, the muscular fibres being disposed circularly round the vessel. The muscular fibres are wanting in some parts of the venous system, and specially developed in others. In the *venæ cavæ* and pulmonary veins near the heart striped muscular fibres may be detected, continuous with those in the auricles. The *external coat* consists of connective or areolar tissue, and of longitudinal elastic fibres; within some of the larger veins, as the inferior *vena cava*, through its whole length, the external iliacs, the azygos, &c., there is also a longitudinal network of unstriped muscular fibres. The existence of valves in the veins is mentioned in the article CIRCULATION. These valves are most numerous in the veins of the extremities, especially the lower ones, these vessels having to act against the force of gravity more than most others. They are absent in the *venæ cavæ*, the hepatic, portal, renal, pulmonary, and some other large veins, and in very small veins generally. The veins are nourished by nutrient vessels, or *vasa vasorum*, like the arteries; but except in a few instances (including the inferior *vena cava*) nerves are not distributed to them. For the chief diseases of the venous system, see the articles PHLEBITIS, THROMBOSIS, and VARICOSE VEINS.

Veins, in Geology, are crevices or fissures—regular or irregular, and inclined at any angle to the horizon—caused by contraction during consolidation or by mechanical disturbance, and filled up with materials different from the adjacent rocks.

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Veins occupied by ores and other minerals are termed lodes (see ORE, MINING, GOLD, &c.). These very often occur on lines of fracture (see DISLOCATIONS). Some veins, again, consist of intrusions of Igneous Rock (q.v.). See DYKES, GEOLOGY.

Veit, PHILIPP, painter, was born at Berlin, February 13, 1793. His mother, a daughter of Moses Mendelssohn, had for her second husband Friedrich Schlegel, and Veit became devotedly attached to the religious and artistic ideas of his stepfather, like whom he embraced Catholicism. After finishing his studies at Dresden, he proceeded to Rome in 1815, and became a prominent member of that band of young German painters who sought to infuse into modern art the purity and earnestness of mediæval times. Of all the associates Veit ventured furthest into the obscure realms of symbolism and allegory. His first famous work was the 'Seven Years of Plenty,' executed as a companion-piece to Overbeck's 'Seven Years of Dearth,' and forming part of a series of frescoes illustrative of the history of Joseph, painted at the Villa Bartholdy in Rome. Other pictures of his Roman period are 'The Triumph of Religion' (Vatican), 'Scenes from Dante's *Paradiso*' (Massimi Villa), and an altarpiece, representing 'Mary Queen of Heaven,' in the Trinità de' Monti. These procured him so great a reputation that he was called in 1830 to the directorship of the Art Institute in Frankfort-on-the-Main. While holding this position he produced many grand pictures, of which the most celebrated is the large fresco (at the Institute) representing 'Christianity bringing the Fine Arts to Germany.' In 1843 he removed to Sachsenhausen in Hesse-Cassel, in 1853 to Mainz. He died December 18, 1877.

Veitch, JOHN, LL.D., born at Peebles, October 24, 1829, studied at the university of Edinburgh, and from 1855 to 1860 was assistant to successively Sir William Hamilton and Professor Fraser. He himself became professor of Logic and Rhetoric at St Andrews in 1860, and at Glasgow in 1864. His works include a *Memoir of Sir W. Hamilton* (1869), *Tweed and other Poems* (1875), *History and Poetry of the Scottish Border* (1877; new ed. 1892), *Feeling for Nature in Scottish Poetry* (1887), *Knowing and Being* (1889), and *Merlin and other Poems* (1889).

Veitch, WILLIAM, born of farming parents in Liddesdale, 1794, qualified at Edinburgh University for the Church of Scotland, in which, however, he never held a charge. Finding his true walk in Latin and Greek scholarship, he published an ably-constructed text of Cicero's *De Natura*, and *Greek Verbs Irregular and Defective* (1848; 4th ed. 1878). This work placed him in the front rank of European scholars, and led to his employment by Liddell and Scott in revising successive editions of their Lexicon. He rendered similar services to Smith's *Latin-English Dictionary*, and to a vast number of school-books and works of reference, classical and theological, generally at the solicitation of their editors whom he had trenchantly reviewed. In 1866 his Alma Mater gave him her degree of LL.D. A humorist and entertaining *raconteur* to the last, he died in Edinburgh, July 8, 1885.

Velazquez, DIEGO DE SILVA, was born at Seville, 1599, the son of Juan Rodriguez de Silva and Geronima Velazquez. His father was a cadet of the noble Portuguese family of Silva, but, like Gongora and others, he gave the preference to his mother's name, an old and well-known Seville one. Properly speaking, Velazquez was a self-taught painter. He studied under Herrera 'el Viejo,' a man of marked originality, but of a temper and manners that drove away pupils as fast as his ability attracted them. What Herrera really taught Velazquez was how to teach himself. He used to set his pupils to make *bodegones*, 'cook-shop studies' of meat, fish, loaves, melons, pots and pans, and the like, and thus it was that Velazquez acquired the power that manifests itself in all he did, of seeing what he had to paint and painting what he saw with unerring firmness and truth. His second master was Pacheco, Herrera's opposite in many ways, a feeble, conventional painter, but a man of some culture and refinement, whose greatest merit, perhaps, is that from the first he recognised his pupil's genius, and worshipped it to the last. But Velazquez was only nominally his pupil; he followed his own course of instruction, passing from still-life to life models, the peasant lad whom he hired as a study, or the faces and figures he found in the streets and market-places of Seville. In 1622 he visited Madrid, and was kindly received by his fellow-townsman, Fonseca, by whose advice he returned the next year, bringing with him as a specimen of his work one of his Seville street studies, the famous 'Water-seller,' now in Apsley House, presented by Ferdinand VII. to the Duke of Wellington, who had intercepted it at Vittoria on its way to France in Joseph Bonaparte's carriage. By Fonseca he was introduced to Olivares, and by him presented to the king, who commissioned him to paint his portrait, the first of some forty in which he painted Philip IV. youthful, elderly, on foot, on horseback, hunting, praying, in armour, in velvet, head, bust, half-length, full-length, and made him, so far as paint and canvas could, the best-known monarch in history. The portrait was a complete success, and Velazquez was appointed *pintor de camara*, with a salary of 20 ducats a month over and above the price paid for his pictures. He was thus at the outset relieved from the necessity of seeking the patronage of the church, and painting altarpieces, martyrdoms, and miracles. Fortune for once sided with genius in his case. Even the course of true love ran smooth with him, for when, in obedience to what seems a law in the lives of painters, he fell in love with his master's daughter, Pacheco, who by all precedent was bound to send him packing, accepted him gladly for a son-in-law. In the same year (1623) Charles, Prince of Wales, during his hair-brained wooing at Madrid, sat to him for his portrait; and in 1627, by the king's order, he painted 'The Expulsion of the Moriscos' in competition with Caxes, Carducho, and Nardi, the prize being the office of usher of the chamber, which was unhesitatingly awarded to Velazquez by the judges, Mayno and Crescenzi. In 1629 he obtained leave of absence to enable him to improve his acquaintance with Italian art, and spent two years in Venice, Rome, and Naples. On his return fresh honours and emoluments were bestowed upon him, and a studio close to the royal apartments assigned to him, where the king used to spend some hours daily watching the progress of his works. He was in Italy again in 1648–50, this time with a commission from the king to purchase works of art. In 1652 he was appointed Aposentador Mayor, a high dignity, the bestowal of which posterity has had reason to lament, for the duties took him away from his painting-room, and undoubtedly shortened his life. It fell to him, *ex officio*, to direct the arrangements for the marriage of the Infanta with Louis XIV., but more particularly the erection and decoration of the pavilion on the Isle of Pheasants in the Bidasoa, where the ceremony was to take place; and a tertian fever contracted there carried him off, a week after his return to Madrid, 6th August 1660.

Velazquez may be said to have been all but a *pictor ignotus* until the beginning of the 19th century. While the works of other great painters,

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who painted for churches, monasteries, and uncrowned heads, passed from time to time into the market and were scattered broadcast, his remained for the most part royal property, and only to be seen on palace walls, in the Alcazar of Madrid, the Buen Retiro, the Pardo, or the Escorial. To this in a measure they owed their preservation from the military art-collectors of 1808–10, who were bound to respect pictures that belonged to the heritage of Joseph Bonaparte; but doubtless insensibility to their merits was also a protection, for Velazquez offered little temptation to men whose taste had been formed by David. The transfer of the royal pictures to the Museo del Prado at Madrid was virtually a revelation of Velazquez, and it caused his outlying works to be eagerly sought after by collectors of all nationalities. Mr C. B. Curtis reckons up 274 attributed to him, of which no less than 121 are to be found in the United Kingdom, more than half of them being in London. France and Austria possess twelve each, Italy ten, and Russia and the United States seven each. In quality as well as quantity Velazquez is better represented in England than elsewhere, Madrid of course excepted. Good examples of his early work are to be found in the 'Water-seller' and in the 'Adoration of the Shepherds,' and 'Christ in the House of Martha' (National Gallery), painted under the influence of Ribera and Tristan, before he had settled down to a style of his own; and of his maturer powers in the 'Boar-hunt,' and the portraits of Philip IV. (National Gallery), Innocent X. and Quevedo in Apsley House, Philip IV. and Olivares in Mr Holford's gallery, and others in Lord Ellesmere's, Lord Lansdowne's, the Duke of Westminster's, and at Dulwich. The best of all, however, and, no doubt, the finest Velazquez outside the walls of the Madrid Museo, is the portrait of Admiral Pulido Pareja in the National Gallery, painted, like most of his greater works, with brushes of a length that enabled him to stand at the distance from which he meant it to be seen, and so to produce effects that Palomino justly calls 'miraculous.' To any one properly placed the story of the king's reprimand addressed to the portrait will not seem incredible. But it is only at Madrid that Velazquez can be seen in the full variety of his powers, a master in portrait, genre, landscape, animal, and, in fact, every branch of painting except the marine. Philip IV. was too true a lover of art to restrict him to the functions of a court-painter, and Velazquez apparently was allowed a free hand to paint such subjects as took his fancy. His court-pictures, the grand equestrian portraits of the king, Olivares, Prince Baltasar Carlos, and the like, are the more conspicuous, but the more characteristic and perhaps more interesting are the portraits of the *truhanes*, jesters, and odd characters that figure in catalogues and guidebooks under arbitrary titles, or else the nicknames of the originals, 'Menippus,' 'Esop,' 'Barbarossa,' &c. These, and his matchless series of dwarfs, were clearly subjects chosen for their own sakes, painted *con amore*, and treated in the spirit of a hidalgo Hogarth. But if he is to be compared to any man it is to his compatriot Cervantes, as an exponent of Spanish realism and Spanish character. It is sometimes said that sacred subjects and female beauty were beyond his reach, and that he could paint nothing that he had not before his eyes. And yet no painter ever painted a more profoundly pathetic Crucifixion than the one in the Prado, or two more charming figures than the 'Meninas' in the marvellous picture named after them, or a more thoroughly dramatic scene than the 'Surrender of Breda,' which might be a scene from a historical play by Shakespeare transferred to canvas.

See Pacheco, *Arte de la Pintura* (1649; reprinted 1866); Palomino, *Museo Pictorico* (1715–24); Ford, *Velazquez* (*Penny Cyclopædia*), *Handbook for Spain*; Head, *Handbook of the Spanish and French Schools of Painting* (1848); Stirling, *Annals of the Artists of Spain* (1848), *Velazquez and his Works* (1855); C. B. Curtis, *Velazquez and Murillo, a descriptive Catalogue* (1883); Justi, *Velazquez und sein Jahrhundert* (1888; Eng. trans. by A. H. Keane, 1889).—In France, and usually in England also, the painter's name is spelt *Velasquez*.

Velazquez, the Conquistador. See CORTES.

Veldes, a village in the Austrian province of Carniola, 30 miles NW. of Laibach. A summer-resort, situated on a beautiful lake, it is specially famous for its 'sun-baths,' the whole body (except the head, which is sheltered) being exposed to sunshine. Pop. 500.

Veleia, an ancient Ligurian city, whose ruins, 20 miles S. of Piacenza, were uncovered in 1760–65, and yielded many Roman antiquities, including tablets with inscriptions, coins, &c. The place seems to have been overwhelmed by a landslip about 280 A.D.

Vélez-Málaga, a Spanish town 16 miles E. of Malaga, near the mouth of the Velez, with a Moorish castle and sugar-refineries. Pop. 23,425.

Velleius Paterculus. See PATERCULUS.

Velletri, a city at the foot of the Alban hills, 25 miles SE. of Rome by rail, with a cathedral and many fine palaces. Pop. 13,532.

Vellore, a town of British India, 80 miles W. of Madras by rail, famous for its old fortress defended for two years by the English against Hyder Ali. Here Tippoo Saib's family lived till 1806, when, after a bloody mutiny of sepoys, they were transferred to Calcutta. Pop. 38,022.

Vellozia, a genus of plants of the natural order Hæmodoraceæ, natives of Brazil, Africa, Guiana, and Madagascar, and sometimes called *Tree Lilies*. They are perennials, with trunks closely covered by the withered remains of leaves, branching by forks, and bearing tufts of long, narrow, aloe-like leaves at the extremities of the branches. Some of them are from 2 to 10 feet high, and the trunk is sometimes as thick as a man's body. The structure of the trunk is very remarkable. It has a slender sub-cylindrical central column, of the ordinary monocotyledonous structure, outside of which are arranged great quantities of slender fibrous roots, which cohere firmly by their own cellular surface, and form a spurious kind of wood. The flowers of the larger species are about 6 inches long, pure white, yellow, blue, or purple.

Vellum. See PARCHMENT.

Velocipede. See CYCLING.

Velocity, in its full significance, involves the notion of direction of motion as well as that of speed or rate of motion. The notion of speed is a very familiar one. In measuring it we assume the possibility of measuring space and time; and the unit of speed is that speed which a moving point would need to have in order to pass over the chosen unit of space in a unit of time. Such phrases as four miles per hour, one mile per minute, eighteen miles per second are perfectly intelligible to all who know what a mile, hour, minute, and second are. It should be noted that when we speak of a man walking with a speed of four miles an hour we do not necessarily imply that he really completes four miles, or that he walks for one hour, but only that he would do so were he to keep up that speed for the time named. In fact, speed is an instantaneous property of the moving point. Again, since at every instant the moving point

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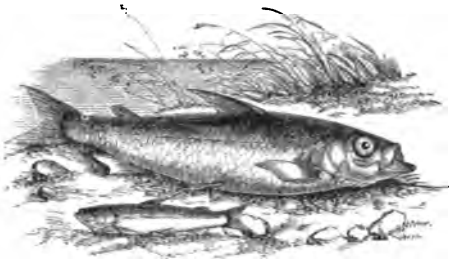
must be moving in a definite direction, as well as with a definite speed, it follows that velocity also is an instantaneous property. If it does not change from instant to instant, the velocity is constant, and the point moves in a straight line with constant speed. If the point moves in any other than a straight line, the velocity will be variable even although the speed should remain constant; and the most general change of velocity involves both change of direction and change of speed. Velocity is in fact a vector quantity, and may be treated mathematically as a Vector (q.v.). The rate at which velocity changes is called acceleration. When the velocity changes in direction only, as when a point moves with constant speed in a circle, there is no acceleration in the direction of motion —i.e. parallel to the velocity. The acceleration must therefore be wholly normal to the velocity, and will be towards the centre of the circle in the simple case of uniform circular motion. If any change of speed occurs it is due to an acceleration acting parallel to the velocity, and therefore tangential to the path pursued by the moving point. When only a tangential acceleration exists, the point will move in a straight line with variable speed. A body falling vertically near the earth's surface gives a very good illustration of a pure tangential acceleration. See COMPOSITION, FORCE, HODOGRAPH, MOTION (LAWS OF).

Velvet is one of the most familiar of what are known as pile fabrics. It is produced by adding to the usual warp and weft threads of plain weaving an additional row of warp yarns which are woven into the ground of the cloth, and passed over wires on the surface. In the case of a loop pile (see CARPETS, fig. 3) the wires are simply drawn out, but for velvet or other cut pile a knife is first passed along a groove on the top of each wire to cut the pile before the wire is withdrawn. Real velvet is made entirely of silk, but a kind is made with a silk face on a cotton basis. For cotton fabrics made in the same way as velvet, including velveteen, see FUSTIAN; the name velveteen is however extended to fabrics in which silk and cotton are mixed throughout. Some of the richest and most artistic of the many splendid textiles woven on Italian looms in the 15th and 16th centuries were made, in part at least, of velvet. Similar stuffs were also made in Spain and Flanders. Many of these were for ecclesiastical vestments, altar cloths, and the like, as well as for hangings. Plain velvets were likewise woven. The effect of a raised pattern in velvet on a plain or figured silk ground is often very beautiful. Sometimes a diaper design was formed of a long upon a short pile, called velvet upon velvet, and this too has a fine effect. Choice examples of these old velvet fabrics are preserved in some industrial art collections. Velvet is believed to have been first made in China. Modern velvets are largely made at Lyons and Crefeld.

Venaissin, an ancient county of France, between the Rhone and the Durance (named from its capital the village of Venasque), now included in Vaucluse.

Vendace (*Coregonus vandesius*), a species or variety of the large genus Coregonus (q.v.), found in rivers and lakes of Sweden, and in the Castle Loch at Lochmaben in Scotland. It is popularly said to have been introduced at Lochmaben by Queen Mary; but the statement rests on no authority. Like most of its congeners, the vendace is a palatable fish. Its food consists chiefly of minute crustaceans. It generally swims in shoals, often with a remarkable separation of the sexes. It attains a length of 6–8 inches; the outline rises quickly from the snout to the dorsal fin, and the body tapers rather suddenly at the tail; the under jaw projects a little; the tail is deeply forked, and the dorsal and ventral fins are long. The back is brown, the sides tinged with yellow, the cheeks



Vendace (*Coregonus vandesius*).

partly white, and there is a red heart-shaped mark between the eyes. The vendace spawns in November and December, and multiplies rapidly; but it is now scarce at Lochmaben.

Vendée, LA, a maritime dept. of western France, bounded on the W. by the Bay of Biscay, on the N. by Loire-Inférieure, and on the S. by Charente-Inférieure. Area, 2588 sq. m.; pop. (1886) 434,808; (1891) 442,355. The dept., which owes its name to a small affluent of the Charente, is traversed from east to west by a range of hills, called in the east the Plateau de Gatin, and in the west the Collines Nantaises, and is watered in the north by the affluents of the Loire, and in the south by the Lay and the affluents of the Charente. Of its three divisions the western is the *Marais*, occupied by salt marshes and lakes; the northern, the *Bocage*, covered with plantations; in the south and middle is the *Plaine*, an open and fertile tract. The coast-line, 93 miles in length, presents few deep indentations, the chief being the safe Bay of Aiguillon. There are three arrondissements—La Roche-sur-Yon, Fontenay-le-Comte, and Sables-d'Olonne. The capital is La Roche-sur-Yon.—For the obstinate resistance of the Vendeans to the Revolution, and the bloody vengeance of the Republic (1793, 1794–95, 1799, and 1815), see CATHELINEAU, LAROCHEJACQUELEIN, HOCHE, and CHOUANS.

Vendémiaire (the 'vintage-month'), the first month in the French Revolution calendar, from September 22 to October 21. Memorable in the history of the Revolution is the 13th Vendémiaire of the year IV. (5th October 1795), when the Paris Sections, worked upon by royalist reactionaries, rose in insurrection against the National Convention, but were crushed by the historic whiff of grape-shot by Napoleon Bonaparte, then a young artillery officer.

Vendetta, the term used to denote the practice, as it existed till lately in Sicily, Corsica, Sardinia, of individuals taking private vengeance upon those who had shed the blood of their relatives. It is not yet entirely extinct in Calabria and Corsica, and even in remote districts of Kentucky and other parts of the United States, and indeed was an established institution in primitive society everywhere. Our criminal law is merely a development of a stage of culture when it was every man's right and duty to take the law into his own hands. Bloodshed had to be atoned for by death, and if the actual slayer had escaped his kinsfolk were held responsible for his deeds, and he was punished through vengeance taken upon them. This primitive law of vengeance of blood afforded an elementary means of protection for society, and the fact that the whole family are held responsible brings

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to bear the full pressure of the family influence to make each of its members keep the peace. The Avenger of Blood is thus a useful functionary, but through ignorance and passion he is prone to err and confound the innocent with the guilty. In the usage of the Israelites we see the method of progress in civilisation—a distinction is made between the wilful and the innocent slayer, and the Cities of Refuge afford the latter a Sanctuary (q.v.). Again we see how the cry for vengeance sinks into a claim for compensation—the blood-money wipes out the blood. Our Anglo-Saxon forefathers had their *wér-gild* ('man-money'), a money value on each man's life which had to be paid to his kinsmen by the murderer—600 shillings for a thegn, 200 for a ceorl, and naturally less for a Welshman than an Englishman. The law of retaliation—the Roman *lex talionis*—held also for lesser injuries, and was sound morality enough till it was superseded by the higher law of the Gospel. Now the state undertakes the task of punishment, but, as Tylor says, we have still survivals of ancient modes of feeling in such phrases as 'the vengeance of the law,' or the legal form by which a private person is bound over to prosecute as though still suing for his own revenge or compensation. The right of private war between families and tribes long survived in the Borders and the Highlands; but Freeman notes that the battle (1470) between Lord Berkeley and Lord Lisle at Nibley Green in Gloucestershire, in which the latter was slain and Berkeley compounded by a money payment to the widow, was the latest English example either of private war or the payment of the *wér-gild*.

Of all civilised races the vendetta has survived longest among the Italians, and even so late as 1890 it showed itself in strange juxtaposition to the law in the murder at New Orleans of the chief of police who had been instrumental in bringing to light some of the organised murders of the Maffia (q.v.). In Corsica it was a sacred article of duty, so binding that it needed not the *rimbicco*, the wail of reproach against delay, to spur up the consciences of the next of kin. Here it often happened that its course was complicated by the *vendetta transversale*, when each of two sets of relatives had a murder to avenge on the other. Mérimée's *Colomba* is a striking picture of the intensity with which the imaginations of the Corsican women clung to the wild justice of this form of revenge. And something similar in spirit, as the vendetta of a class or community rather than a person or family, were the cruel murders and outrages committed by Irish peasants or their hirelings upon those who had occupied land from which other men had been evicted. In Corsica at least it needed the burning outrage of blood to rouse the spirit of the vendetta. See BLOOD (AVENGER OF).

Vendôme, a town of the dept. Loir-et-Cher, on the Loir, 42 miles NNE. of Tours and 111 SW. of Paris by rail. Above it rise the picturesque ruins of the castle of the Dukes of Vendôme, destroyed at the Revolution, and within the town is a fine 15th-century abbey church, with early Gothic tower and spire. Gloves and paper are made. Pop. (1891) 7864.

Vendôme, an ancient countship of France, erected into a duchy by Francis I., for behoof of Charles de Bourbon, through whom it fell to his grandson, Henry IV., who again conferred it upon César, the eldest of his sons by Gabrielle d'Estrées. César's eldest son, Louis, Duke of Vendôme, married Laura Mancini, one of Mazarin's nieces, and had by her three sons, the eldest of whom was the famous soldier, Louis-Joseph, Duke of Vendôme, called till his father's death the Duc de Penthièvre. He was born at Paris, July 1, 1654, and saw his first service in the Dutch campaign of 1672. He next served with distinction under Turenne in Germany and Alsace, again in the Low Countries under Luxembourg, in Italy under Catinat, and received in 1695 the command of the army in Catalonia. He shook off his indolence, and closed a series of brilliant successes by the capture of Barcelona (1697). After five years of sloth and sensuality he superseded Villeroi in Italy, much to the delight of the soldiers. He fought an undecided battle with Prince Eugene at Luzzara (15th August), then burst into the Tyrol, returning to Italy to check the united Savoyards and Austrians. On 16th August 1705 he fought a second indecisive battle with Prince Eugene at Cassano, and at Calcinato he crushed the Austrians (19th April 1706). That summer he was recalled to supersede Villeroi in the Low Countries, under nominal command of the Duke of Burgundy. The defeat at Oudenarde (11th July 1708) cost him his command, but in 1710 he was sent to Spain to aid Philip V. His appearance turned the tide of disaster; he brought the king back to Madrid, and defeated the English at Brihuega, and next day the Austrians at Villaviciosa. After a month of gluttony beyond even his wont, he died at Tinaroz in Valencia, June 11, 1712. Saint-Simon hated Vendôme, and has gibbeted to all eternity his sloth, his gluttony, and his shameless debauchery.

Vendors. See SALE.

Veneer. Beautifully grained or figured woods are, owing to their cost, rarely used in the form of solid boards, but are cut into thin slices called veneers. These vary in thickness from that of ordinary writing-paper to $\frac{1}{16}$th of an inch and upwards for special purposes. For furniture $\frac{1}{28}$th is a good average thickness. There are 'saw cut' and 'knife cut' veneers, very thin kinds as well as those sliced off in circular fashion from round blocks being always knife cut. The process of veneering consists in simply glueing the veneer to thicker wood, and placing what is then virtually one solid board or panel with the veneer face downwards on a metal table heated with gas. By means of cross bars and screws, above and below the table top, the veneer is held tightly to its backing for two or three hours till the glue is dry and firm. It will be readily understood that veneering is best done on woods which hold glue well—plain mahogany, American yellow pine, &c.

Ven'ema, HERMANN (1697–1787), divine and professor of Theology at Franeker. Of his numerous works, the *Institutes of Theology* (trans. 1850) is the best known.

Venereal Diseases. See GONORRHEA, SYPHILIS.

Venesection. See BLEEDING.

Venetian Style, the type of the Renaissance (q.v.) developed in Venice (see ITALIAN ARCHITECTURE). 'Venetian-Gothic' is a type of Italian-Gothic.

Venezuela, UNITED STATES OF, a northern republic of South America, between the Caribbean Sea, Colombia, Brazil, and British Guiana. The total area is slightly over 417,000 sq. m. According to official returns it is 594,165 sq. m., but this result is obtained by disregarding recent boundary decisions. In 1891 the frontier dispute with Colombia was decided by the arbiter Spain in Colombia's favour, and the south-western boundary is now formed by the rivers Arauca, Orinoco, Atabopo, and Negro, while the whole peninsula of Goajira and the town and territory of San Faustino (on the Santander border) belong to Colombia; and in 1880–82 a Venezuelo-Brazilian commission marked

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off a definite southern frontier, which may be seen in the *Zeitschr. d. Gesellsch. für Erdkunde zu Berlin* (Bd. xxii. 1887). Venezuelan maps, moreover, extend the north-eastern boundary along the coast as far as the mouth of the Essequibo River, instead of only to that of the Amacuro, and between 1° and 4° N. lat. push the frontier even beyond the Essequibo, cutting a large, tongue-like territory out of British Guiana; this, however, the British colonial government formally took possession of in 1892. It is necessary to go thus into details, because the new frontier limits had not found their way into the atlases by the end of 1892. The republic has a coast-line of about 750 miles, low and sandy eastward of Cape Peñas, opposite Trinidad. Trinidad and Tobago islands belong to Britain, and Curaçao, Oruba, and Bonaire to the Netherlands.

Venezuela is a land of mountains and valleys in the west and north, of lower mountains and wooded hills in the south, of llanos between the Orinoco and the northern ranges, and of lake and swamp and forest in the north-west. The Andes enter the country south of Lake Maracaybo, and push north-eastward as the Cordillera de Merida (15,500 feet) as far as Barquisimeto (190 miles), where they are cut off from the Caribbean ranges by a depression through which the Cojedes flows to the Orinoco and the Yaracui to the Golfo Triste. From this point along the north stretch two more or less parallel coast-ranges, pierced by valleys, and joined by cross-ranges, and thus enclosing lakes (e.g. Valencia), most of which, however, have dried up. Still farther north, and parallel to these last, a range is distinguished, partly submarine, partly rising in the islands along the coast, partly in the often high and generally rock-bound coast itself. Turning now to the south we find all the country beyond the Orinoco filled with low mountains and, nearer the river, hills, thrown out by the great eastern mountain-system of the continent. Here, above a granitic foundation, rise great masses of red and white sandstones, the most notable Mount Roraima (q.v.), where the frontiers of Guiana, Brazil, and Venezuela meet. Innumerable streams find a way over waterfalls and rapids to the Orinoco, which itself rises amid these mountains, escapes to the west, and then flows north along their edge till they come to an end, when, turned by the volume of the Apure, it swings round to the east and rolls past their northern bounds.

The llanos occupy a fourth of the country, lying between the Orinoco and the northern chains, and are mostly undulating plains of long grass, broken by low plateaus or *mesas*, and by numerous clumps of trees and belts of forest, which are not confined to the banks of streams, but rise out of the savannah. It must be noted, however, that the llanos north of the lower Orinoco, towards Paria peninsula, are dreary and sand-swept, and treeless except along the shallow watercourses. Humboldt saw the llanos bare of aught save grass, and supporting countless herds of cattle; to-day most of the cattle have disappeared, killed off in great part to feed the insurgents in the various civil wars; and as a result the young trees have had a chance to grow. The remaining portion of the country, the north-western, around Lake Maracaybo, is rendered almost uninhabitable by its swamps, morasses, and pestiferous climate. Taken as a whole the climate of Venezuela cannot fairly be described as unhealthy. Of course, in a country enclosed between the parallels 2° and 12° N. lat., with the accompanying luxuriant vegetation, tropical fevers must be present; but South American fevers are not so fatal as those of Africa, and even the yellow fever, though it still is a scourge, is being coped with to some extent. The climate is moist: the llanos have the rainy season in the summer months, but in the mountains the fall is irregular and at all seasons, losing its tropical character. The temperature varies, of course, with the altitude, from freezing-point above the snow-line to great heat in the coast-towns, the valleys, and the llanos. In the *tierra caliente* (hot region, up to 1700 feet, the limit of the cocoa-nut and cocoa) the yearly mean is from 77° to 86° F., ranging often above 100°; in the *tierra templada* (temperate region, 1700 to 7200 feet, the limit of the banana and sugar-cane) it is from 50° to 77°; and the *tierra fria* (cold region) embraces everything below 50°. There are no active volcanoes in Venezuela, but earthquakes have done great damage at Carácas and elsewhere.

Almost everywhere the country is very abundantly watered, the drainage passing off by eight systems —the Orinoco, the Rio Negro, the Cuyuni, the lakes of Maracaybo and Valencia, the two gulfs on either side of the peninsula of Paria, and the short coast-streams. Vegetation in the tierra caliente is luxuriant often beyond description; the heavy forests are dense with noble trees, and yield gums, balsams, dye-woods, india-rubber, sarsaparilla, cinchona, vanilla, tonka-beans, &c.; tobacco, maize, and cocoa are cultivated. Where water fails in the low-lying valleys cactus forms prevail. In the temperate region coffee is the most valuable product; others are cinchona, sugar, maize, bananas, some cotton, and wheat and barley; these last are grown also in the higher regions, as are peas and beans and much potatoes. But for the most part primitive methods and implements of agriculture are obstinately adhered to. Agriculture suffers, too, in some parts severely, from periodic plagues of locusts.

The fauna is rich in animals and birds peculiar to the tropics, but is of great variety owing to the differences of altitude and temperature. The people are mostly half-breeds—mulattos or mestizoes (i.e. of crossed white and Indian blood). Pure negroes or whites are comparatively few; the latter form perhaps 1 per cent. of the population. The blacks are found mostly in the tierra caliente—chiefly on the coast; the survivors of the pure Indian stems are mainly confined to the highest regions, that of the lofty *páramos*, although they are found also in the Maracaybo forests and elsewhere, and in the llanos large villages of nearly pure Indians are met with. The Venezuelans are restless and passionate —least so in the cordillera region—honest and hospitable, universally polite, except among the llaneros, and as a nation sadly addicted to drink; rum in this land of sugar is manufactured everywhere, and its consumption in the ubiquitous *pulperias* occupies the general leisure, the lower classes adding gambling to the other vice; bull-fights and yet more cock-fights, and in the cooler regions horseracing, are the popular pastimes. The Roman Catholic is the state religion; others are tolerated. In 1870 primary education was made compulsory, but only 100,000 children take advantage of the 1600 public schools. There are two universities, at Carácas and Merida; the faculties of law and medicine are the most flourishing, for Venezuelans are fond of public life, and the overcrowded professions, in which all cannot find employment, contribute more than their quota to the ranks of the discontented and revolutionary.

Venezuela contains rich mineral deposits, as yet scarcely tapped, except for the Yuruari gold-mines, the Aroa copper-mine, various salt-mines worked by the government, and coal near Barcelona. In the neighbourhood of Lake Maracaybo there are rich springs of petroleum, and coal is abundant here, as well as in the peninsula of Paraguana; and a bituminous plain at the head of the Gulf of Paria

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separates from the rest of the mainland the so-called 'island' of Brea. Valuable emeralds are found on the upper Orinoco. But the yearly value of minerals extracted is only £1,100,000 (£950,000 of this for gold). Manufactures are very backward; books (at Carácas), furniture, soap, tallow-candles, cheese almost exhaust the list; but sugar is refined in many parts, and rum and newspapers are produced everywhere. Official returns in 1888 claim 8,476,300 cattle, 5,727,500 goats and sheep, 1,929,700 swine, &c., as against 2,926,733 cattle, 3,490,563 goats and sheep, 976,500 swine, &c. in 1883. Trade has advanced within recent years, in spite of the absence or deplorable state of roads in the interior—though something has been done for this too. The first railway was made in 1877; in 1891 there were 282 miles in operation, besides 3528 miles of telegraph lines and several telephone systems. Most of the over-sea trade is in the hands of foreigners, German and other. By far the principal export from Venezuela (over two-thirds of the total exports) is coffee; next follow cocoa, gold, hides, cattle, sugar, cotton, copper, dye-woods, &c. The imports (over a fourth from Britain) are flour, cotton, linen, woollen, and jute goods, iron, machinery, glass and porcelain, paper, wine, beer, &c. In the years 1887–90 the imports advanced steadily from £3,158,000 to £3,344,500, and the exports from £3,376,500 to £4,036,700. Nearly six-sevenths of the total value of imports pays duty, and smuggling is actively carried on.

In 1881 Venezuela—till 1863 made up of provinces, and in 1864 constituted a federal republic, with twenty-one states and their territories—was redivided into eight large states, eight territories, two agricultural colonies, and the federal district of Carácas. The population in 1881 numbered 2,075,245, in 1891 2,323,527; of these 326,000 are Indians, and 35,000 foreigners. Each state and the federal district elect three senators, and every 35,000 of the population return one representative to congress. A federal council of nineteen members, appointed by congress every two years, chooses one of its own members for the presidency; and neither president nor councillors can be re-elected (see, however, below, under *History*). The president has no power of veto. Each state has its own executive, legislative, and justiciary. The revenue (mostly from customs duties) and the expenditure nearly balance each other at from £1,500,000 to £1,800,000. The government at the end of 1890 returned the national debt at £1,532,000, but the history of the foreign debt has been, as usual in South America, one very unsatisfactory for the bondholders. The army in 1891 numbered 5760 officers and men, including generals; and there is a militia which embraces all citizens from eighteen to forty-five, and which has supplied most of the forces for the civil wars. The principal cities are Carácas, Valencia, Maracaybo, Barquisimeto, Tocuyo, Maturin, and La Guayra. The chief ports are La Guayra, Puerto Cabello, Ciudad Bolívar (the port of entry for all southern Venezuela), Maracaybo, and Guanta (opened 1892; 12 miles by rail from Barcelona).

History.—Columbus on his third voyage discovered the Paria coast on 31st July 1498. The next year the whole Venezuelan coast was skirted by Ojeda and Amerigo Vespucci, and the name 'Little Venice' was given to an Indian village built on piles (as still is common) on the shores of Lake Maracaybo; this is the origin of 'Venezuela,' the name now of the whole country. In 1527 the territory of Coro was pledged by Charles V. to the Welsers of Augsburg, whose governors and adventurers (see HUTTEN, PHILIP VON) had eyes and thoughts only for gold and the fabled El Dorado. In 1558 the crown resumed possession; Carácas was founded in 1567, and in 1578 became the seat of government; the conquistadores penetrated inland in all directions, and settlements were made in many parts. During the 17th century the attentions of the crown were limited to extracting as much revenue from the colony as possible, while the people entered earnestly on agriculture and stock-raising, and the various religious orders arrived and partitioned out the territory among themselves. But the next century saw the beginning of troubles. The government insisted on all trade being carried on with Spain alone, and ultimately with only one city—first Seville, then, till 1778, Cadiz. Legitimate commerce dwindled away, and smuggling by the Dutch and English alone interfered to keep down the enormous prices of European goods. Only Spanish-born officials were appointed, and a hatred grew up between them and the creoles which bore fruit in open violence. The first revolt occurred in 1749; other outbreaks kept the land in a ferment, until in 1810 the revolution began which ended in the independence of the country, and the withdrawal of the royal forces in 1821 (see BOLÍVAR). Venezuela was united with Colombia (q.v.) and Ecuador; but these states soon fell away, and Venezuela was left to enjoy some years of comparative rest until 1847. Then followed twenty-three years of struggle between the 'Yellows' and 'Blues,' or Liberals and Conservatives, 1866–70 being terrible for the bloody *guerra de cinco años*, which left the llanos ruined for years and the country's credit destroyed. From 1870 to 1877 the 'Illustrious American,' General Guzman Blanco, was first dictator and then president, and did much to rescue the country from its embarrassments, resuming the service of the foreign debt, and patching up a quarrel with the Netherlands that had arisen over the old habit of smuggling. Again he held the reins of power in 1879–84 and in 1886–87; but actually he was dictator from 1870 to 1889, other presidents being merely figure-heads appointed by himself. In the latter year, however, the new president, Rojas Paul, broke with his patron, then residing in Paris as envoy and minister to all the European powers; and rumours of corrupt contracts and the bribed surrender of Venezuelan claims raised such indignation against Blanco as drove his friends from office and elected another hostile president, Dr Palacio, in the autumn. But love of office is perhaps more strongly developed in Venezuela than in any other land, and the dispossessed officials were eager for a return to power. Palacio, who entered on office a penniless lawyer, and proceeded industriously to enrich himself, played into their hands; public sentiment swung round to Blanco's party again; and in 1892, when Palacio, discounting the passing of a bill proposed by himself to extend the presidential term to four years, declined to resign, civil war broke out. The insurgents were victorious; but great part of the republic was meanwhile reduced to a state of anarchy, and matters were further complicated by an unemployed general in August forming an independent league of five western states and proclaiming himself dictator.

See Dr W. Sievers' *Venezuela* (Hamburg, 1888), and his admirable monograph *Die Cordillere von Merida* (Vienna, 1888), which describes also the northern ranges; also Codazzi, *Resumen de la Geografía de Venezuela* (Paris, 1841); Sachs, *Aus den Llanos* (Leip. 1878); Cazeneuve and Harani, *Les Etats-Unis de Venezuela* (Paris, 1888); Tejera's *Venezuela Pintoresca* (Madrid, 2 vols. 1877), his history (1875), and other histories by Baralt and Urbaneja (to 1831; Carácas, 1865) and Oviedo y Banor (the conquest and settlement; 2 vols. Madrid, 1885). Cf. also, for a special division, Von Langegg's *El Dorado* (Leip. 1888). There are no English works so valuable as some of the consular reports.

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Venial Sin. See CONFESSION.

Venice (Ital. *Venezia*), the 'Pearl' or 'Queen' of the Adriatic. In the 5th century the Veneti, expelled by Lombards and Goths from Padua, Altinum, and Aquileia, found refuge in the islands of the lagoons, making Malamocco their chief port and their seat of government, afterwards (9th century) transferred to Rivo-Alto, the nucleus of Venice. Tradition places its first buildings on the site of the Basilica of S. Mark, and these now cover more than seventy-two islets, or rather mud-banks, their foundations being piles ('time-petrified') and stone. Through its two unequal portions winds for over 2 miles the Grand Canal (Canalazzo), spanned by the Rialto bridge (of stone) and two others (of iron), and from its outer rim flow into the Canalazzo 146 lesser canals, all bridged at frequent intervals.

This vast network of waterway is patrolled by countless gondolas ('the hansom-cab of the Adriatic'), while the pedestrian has his choice of innumerable lanes (calli), making every house accessible sooner or later on foot. A railway viaduct (1845) 2½ miles long connects Venice with the mainland, it being 165 miles E. of Milan, 71 ENE. of Mantua, and 181 NNE. of Florence. Its population, from well-nigh 200,000 in the 15th century, dwindled to 100,000 in the 18th, but has since increased to 158,019, speaking a dialect differing from the more masculine Tuscan in eliding the consonants and running the vowel-syllables into one, *figlio*, for example, becoming *fio*, and *casa*, *cà*. Its industries are its famous glass manufacture, useful and ornamental; jewellery and embroidery in gold and silver; lace, velvets, and silks; candles of wax and spermaceti; soap, sugar, and confectionery. Printing, once its most honourable tradition, is now reviving; while the ship and boat building required for its fishing and pilot-service has, since its restoration to Italy, been supplemented by ironclads, of which several first-class specimens have left its arsenal. Besides an increasing coasting trade, employing over 30,000 tons of shipping, Venice imports from Great Britain coal, iron, and, in much less quantity, fish and manufactured goods; but in spite of engineering intervention it will never regain its historical distinction as a seaport. The alluvial discharge into its gulf has greatly and irregularly reduced its depth of water, its lagoon looking at low ebb (the tidal variation being between 2 and 3 feet) like so many acres of mud. The lagoon is connected with the sea by four entrances, of which the Lido and Malamocco are the most important. Measured even by Italian death-rates Venice is not healthy, but with the drinking-water now supplied from the mainland it is improving. Its prelate still bears the proud title of patriarch.

Detailed reference to all its attractions, architectural, artistic, and historical, belongs to the guide-book, but Venice possesses features distinctive enough for brief notice here. Such are its Piazza di S. Marco, the north side formed by the Procuratie Vecchie, surmounting an arcade of fifty arches, erected 1517, as the residence of the nine procurators of S. Mark, from whom the doge was usually elected. For the increasing number of these dignitaries were built the Procuratie Nuove, on the south side of the Piazza, now constituting a portion of the Palazzo Reale. Of this the library hall is a masterpiece of Sansovino, its ceiling decorated by the seven best Venetian artists of the time (1582), while Titian, Paul Veronese, Bassano, and Tintoretto contributed splendid work to other parts of the interior. The Campanile, begun 902, completed by the belfry 1510, commands from its altitude of 323 feet a glorious prospect. The clock-tower, on whose dial two bronze figures strike the hours upon a bell, gives entrance to the Merceria or main business quarter, threaded by streets converging towards the Rialto. In front of S. Mark's itself rise three red flagstaffs, surmounted by winged lions. From these once floated the silk and gold banners typifying Candia, Cyprus, and the Morea, the three possessions of the republic, now replaced on festas by the flag of Italy. Only less supreme in interest than the Basilica of S. Mark's is the Doge's Palace, which, dating from the 10th and 11th centuries, has been extended and modified, and even in 1892 was being restored. Successive conflagrations have destroyed the paintings by the Bellinis, Carpaccio, Pordenone, and Titian, which ennobled its vast chambers, but its outer shell, particularly the east aspect towards the Bridge of Sighs, commands universal admiration. Ruskin's *Stones of Venice* has familiarised the world with the beauty of its details, its columns with their capitals particularly; but from these and the Porta della Carta of the main entrance, the Scala dei Giganti, and the Scala d'Oro, we must hasten if only to give a glance at the Sala del Maggior Consiglio, and at what remains of the vivid and impressive touch of Titian, Bassano, Tintoretto, Paolo Veronese, and Palma Giovane, who lavished their genius on its walls. The celebrated Library or Biblioteca di San Marco, transferred (1817) from the above-described library hall of the Palazzo Reale, contains 120,000 volumes and 10,000 MSS.—the latter at one time including the codex of Homer, bequeathed by Petrarch, who had received it from Nicolaos Sigeros, ambassador from the Greek emperor, but since destroyed with all the others of Petrarch's bequest. The Museo Archeologico, also shorn of much treasure, among it the maps of those countries explored by Venetian travellers, and originally drawn by the great geographer Gian Battista Ramusio (1485–1557), still repays many a visit, if only for its Mappamondo in which the Camaldolese monk Mauro embodied a geographical encyclopædia of the information accessible up to 1457. Other rooms, the Sala della Bussola (antechamber to the Council of Ten), the Sala del Consiglio dei Dieci itself, the Sala del Senato, and the Sala del Collegio (to mention the more famous of them), have each their special associations and attractions historical or artistic, the interest deepening as we

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mount to the Sotto Piombi ('under the leads') where Casanova and Silvio Pellico languished, or descend to the Pozzi ('wells') which shadow many a page of Venetian history, or emerge from the Doge's Palace to cross the Bridge of Sighs and enter the Carceri or public prisons, sombre as their destination and their records. The Zecca or Mint (now the Bourse) and the granite columns, one bearing the Lion of S. Mark, the other S. Theodore, have infinitely less to detain us than the Basilica di S. Marco itself, placed by Canova above the cathedrals of Pisa and Sienna as, on the whole, the first of the three finest churches in Italy. Signor Ongania's magnificent folio, *La Basilica di San Marco Esposta* (1883), does not suffice to exhaust the interest surrounding and pervading this wonderful edifice, of which the external mosaics, the bronze horses, the interior (also ennobled by its mosaics), the choir, the sacristy, the north transept, the baptistery, the treasury, and the pavement have each their special students and art-votaries, whose admiration a life-long succession of visits seems only to deepen and refine. Dwarfed by comparison, the remaining churches of Venice, formerly more numerous than the Roman ones in proportion to population, need now be noticed only in groups, of which there are four—the first, Gothic in style, exemplified in the plain, massive, and solemn church of the Frari; the second, the so-called Lombard (really a revival of the 15th-century Romanesque), of which the church of the Miracoli is the type; the third, the Italian, locally termed 'classical,' seen at its best in the Palladian Redentore; and the fourth, or modern Italian, ornate to excess, represented by the church of the Salute. Many of these are individually attractive, over and above their history or destination, by artistic *chefs d'œuvre;* that of the SS. Giovanni e Paolo was long famous for its masterpiece by Titian (the 'Death of Peter Martyr'), destroyed by fire in 1867, and replaced by an old copy; and still is for its neighbouring statue of Bartolommeo Colleoni, general of the republic (1475), which, designed by Verocchio and cast by Leopardi, is reckoned the finest art-product of its kind in the world. The church of San Rocco has also a reflected interest from its Scuola hard by, rich in magnificent Tintorettos.

To the museums and picture-galleries, which, as in times past, will always attract the student of painting, we can do even less justice than to the public buildings and churches—the interest of the former consisting in a wealth of *chefs d'œuvre*, around which a whole library of criticism and controversy has for more than a century accumulated. The Accademia delle Belle Arti is annually thronged for its Bellinis (Gentile and Giovanni), its Carpaccios, its Giorgiones, its Palmas (Vecchio and Giovane), its Paolo Veroneses, its Tintorettos, and its Titians; while the Museo Civico, infinitely less attractive in painting, never fails to reward the visits of the lover of majolicas, gems, carvings, autographs, miniatures, and other rarities bequeathed to the city in 1830 by Teodoro Correr. Interest of a sterner kind clings to the arsenal, founded in 1104, busy with 16,000 artisans in the 16th century to maintain the supremacy of the republic afloat, now employing 2000 workmen as the third dockyard for ships and ironclads in Italy. Its museum forms a running commentary on Venetian history, containing the model of the Bucentaur (q.v.) from which the doge every Ascension Day solemnly espoused the Adriatic. From the arsenal to the Grand Canal, with its rows of palaces on either side, we return to artistic Venice, the palaces themselves, notably the Palazzo Manzoni (15th century), the Palazzo Corner (16th century), the Palazzo Rezzonico, the Palazzo Foscari, the Palazzo Pisani a S. Polo, the Palazzo Contarini, followed by the three Mocenigo palaces (the centre one occupied by Lord Byron), the Palazzo Corner Spinelli, and the Palazzo Grimani, down to the Rialto Bridge (beyond which are the Palazzo Camerlenghi and the Palazzo Vendramin Calerghi), all recommended in divers ways for their architectural beauty, their interior arrangement and ornamentation, and their family associations closely linked with the fortunes of the republic. Other palaces of repute are the Palazzo Giovanelli, with its far-famed landscape, in which the nude figures are by Giorgione; the Palazzo Trevisan; and the Palazzo Moro, the traditionally-credited abode of Shakespeare's Othello. In theatres Venice is comparatively poor, La Fenice being the principal one; but in public gardens and islets adapted for holiday purposes it abounds. The Littorale di Malamocco, facing the city across the lagoon (the so-called 'Lido'), is an immensely popular resort, particularly during the bathing season, when it presents a very different aspect from the lonely, haunted-looking strand so dear to the misanthropic mood of Byron. This and the islets Murano (q.v., renowned for its glass), Torcello, and Burano (q.v., employing 300 girls in the celebrated lace-industry) are easily accessible by the steamers and steam-launches which—the latter especially—seem likely to replace the picturesque but much slower and more expensive gondola, not only in the Adriatic but within the city itself.

History.—Venice rises to historical importance 697 A.D. when its island-communities, governed for 240 years by annually elected tribunes, superseded these at the instance of Cristoforo, patriarch of Grado, by a Duke or Doge of absolute authority in church and state, during peace and war. Paolo Lucio Anafesto, first of the long line of Doges, ruled the republic with power and wisdom, suppressing faction, and acquiring from the Lombards a foothold on the mainland. Orso, the third Doge (720–37), gained further advantages over the Lombards, whom he compelled to reinstate the Exarch of Ravenna, for which service the Byzantine emperor honoured him with the title of Ipato (Hypatos) or imperial consul. Gravitating through political interest to Constantinople, Venice opposed the policy of France in the Adriatic and incurred the enmity of Pepin, whose fleet blockaded the Venetians in the central island (Rialto). But the ebbing tide left the invaders stranded off the islet of Albiola, where the light flotilla of Venice annihilated them. From the Rialto, now (810) the seat of government, the Doge Agnello Partecipazio ruled all the neighbouring islets, connecting them with bridges, and forming the modern Venice. Having acquired the relics of S. Mark (827), the Doge Giovanni I. Partecipazio made the evangelist the tutelary saint of Venice, and began (829) the building of his cathedral. A long interval of comparative peace favoured the maritime and mercantile expansion of the city. Istria and Dalmatia were conquered, while commercial relations were opened up with the west and still more with the east as far as the Crimea and Tartary, and made Venice a dominant power in the Levant and one of the leaders of the crusades. Ostensibly religious, but really commercial, this latter enterprise of the Venetians left them stronger in the Mediterranean than ever. Meanwhile the city itself, reduced to ashes by successive conflagrations, replaced its wooden by stone edifices, in which marble from Italian and Dalmatian quarries figured largely, and laid the foundation of those palaces since one of its characteristic features. Extended relations abroad provoked inevitable wars. The crusading expedition of the Doge Faliero, followed up by his successor Domenico Michele, riveted the power of

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Venice in Syria by the reduction of Tyre, and eventually brought the republic into collision with the Byzantine emperor Joannes Comnenus, who decreed the suspension of all intercourse between the two powers. Resorting to swift reprisals, Venice next year (1123) punished the empire by the capture of Rhodes, besieged or sacked the Cyclades, Sporades, and Ionian islands with part of the Morea, and once more reduced Dalmatia, instigated by the Hungarian king to revolt. Siding first with the German emperor and then with the pope, the republic witnessed the meeting of the two (Frederic I. and Alexander III.) within its walls, and was confirmed by the latter in its eternal dominion of the sea. This triumphant policy, diplomatic and strategic, was the work of the Doge Ziani (1172–78), who also improved the city by laying out the Piazza di S. Marco. Enrico Dandolo (q.v.) reduced Trieste, reconquered Zara, and headed the fourth crusade, nominally for Palestine, really against Constantinople, which he stormed. He thus brought about the partition of the Greco-Latin empire, of which Venice received the lion's share—a large slice of Greece and its islands, with a foothold in the Balkan Peninsula, on the Hellespont, and in Constantinople itself, of which a fourth part was reserved for Venetian occupation, protected by Venetian laws and absolutely unrestricted as to trade. To this period belongs the embellishment of the city with the art-treasures of the east—its palaces receiving the care which a territorial aristocracy bestows on its lands, and employing a new and noble school of artists to celebrate the triumphs of the Doges.

Under the second Ziani (1205–29) arose the hostilities with Genoa, culminating in the ten years' naval war in which Dandolo succumbed to Doria, and Venice, shattered at sea, witnessed the re-occupation of Constantinople by Michael Palæologus, with whom the republic had to make truce. The abolition of the old laws regulating the election of the Doge caused the conversion of the republic into an aristocratic oligarchy (1297), whose malgovernment led to conspiracies, the most formidable being that of Quirini-Trepolo, which proved abortive, but gave direct occasion to reforms. Among these was the establishment of the Council of Ten (1310), declared a permanent body in 1335. The mercantile prosperity of this period was reflected in the ornamentation of the city, and an enlargement of the arsenal, whence Francesco Dandolo sailed against the Turks. Andrea Dandolo put down revolt in Candia and Zara, though this was supported by Hungary. The latter Doge's great capacity as a thinker and man of letters appears in his *Venetian Annals*—a model of mediæval history. In 1348 an earthquake upheaved the lagoon, and a seven month's pestilence ensued—the flood and the disease destroying two-fifths of the population and fifty patrician families. To the memorable conspiracy headed by the Doge Marino Faliero (q.v.) the 14th century owes much of its interest, enhanced by the commercial rivalry between Genoa and Venice which culminated in naval battles alternately in favour of either side, till Genoa followed up its latest advantage by seizing the island of Chioggia (1379). Venice in turn became the aggressor, starved the Genoese to the point of surrender, and accepted from them an unconditional capitulation (1380). Sixteen years thereafter Genoa became the dependant of France, and was no longer the effective rival of Venice, which in consequence reassumed its supremacy at sea in war and merchandise, trading with every European country, and with the east as far as India, importing from England the iron of Staffordshire, the tin of Cornwall and Devonshire, and the wool of Sussex. The close of the 14th and beginning of the 15th century saw the Venetian arms triumphant on the Italian mainland, till under the Doge Foscaro (1423–57) the long war with Milan was concluded by a peace, and a league of the Italian states was formed (1454) for the mutual safeguard of their possessions. The later half of the 15th century was chiefly occupied with hostilities against the aggressive Turks, with inter-Italian broils in which petty duke and sovereign pontiff figure, now as enemies, now as allies of Venice, and with a war with France closed by treaty (1499).

The 16th century opens with the oligarchy at the zenith of its power, but this was of short duration. The discovery of America and of a passage to the East Indies began to tell upon its trade, and the constant drain of wars, local and imperial, was not met by the diminished revenue from abroad. Incessant collisions on a great as on a small scale brought about by the League of Cambray impaired commerce and industry, necessitating an undecided policy between the great belligerents Charles V. and Francis I., and an unprofitable neutrality in the religious agitations of Europe. In the 17th century the pressure of Austria became such as to force the oligarchy to side with the enemies of that power—with Henry IV. of France, with Bethlem Gabor and Ragotski, with the Duke of Savoy against Spain, and with the Protestants against the Catholics of the Grisons. In 1644 began the twenty-five years' war in Candia, in which the Venetian admirals defeated the Turks in a succession of mighty engagements, resulting in future successes in Greece and Illyricum in which the highest name is that of the Doge Francesco Morosini, who, after heading his fleet triumphantly for the third time, died at Nauplia (1694). Neutral in the war of the Spanish succession, Venice became again embroiled with Turkey, and lost the Morea and its hold on Candia (1718). Gradual decay marks its subsequent history: its policy became feebler throughout the 18th century, its commerce had sunk irretrievably; so that in 1796 Napoleon found nothing but the shadow of its former self on his invasion of the city. By the shameful treaty of Campo Formio the Austrians became its masters (1798), and again by the Congress of Vienna re-occupied it in compensation for the Belgian provinces. Its revolt of 1848 and heroic defence by Daniel Manin led up to its final cession (1866) to Napoleon III., who handed it over to Victor Emmanuel—the last state but one to become absorbed in united Italy.

See, besides works already cited, C. Yriarte, *Venice: its History, Art, Industries, &c.* (Eng. trans. 1879); Daru, *Histoire de la Republique de Venise* (4th ed. Paris, 9 vols. 1853); and Horatio Brown, *Venetian Studies* (1887), succeeded by his larger *History of Venice;* to which may be added A. J. C. Hare, *Venice* (1884); Mrs Oliphant, *Makers of Venice* (1887); E. Molinier, *Venise; ses Arts décoratifs, ses Musées, et ses Collections* (Paris, 1891); and W. D. Howells, *Venetian Life* (New York, 1866; new ed. 1885). See also the articles ALDINE EDITIONS, CONTARINI, CORNARO, DANDOLO, FALIERO, MANIN, SARPI, and PAINTING, p. 699.

Veni Creator Spiritus, an ancient and celebrated hymn of the Roman Breviary, which occurs in the offices of the Feast of Pentecost for Vespers and Tierce, and in the Pontifical for the Ordination of Priests, Consecration of Bishops or of a Church, the 'Ordo ad Synodum,' and some other solemn services. Its author is not known with certainty. On the authority of Ekkehard's life (*c.* 1220) of Notker, it is ascribed to Charlemagne; and Daniel, in his *Thesaurus Hymnologicus*, adopts this opinion; but it seems to be certainly older than the age of Charlemagne; and its correct classical metre as

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well as language bespeaks an earlier and purer age. Mone thinks it the composition of Gregory the Great; others, of St Ambrose or Rabanus Maurus. It was translated by Bishop Cosin, again by Dryden, whose version was adapted by John Wesley and Toplady. The labours of more than thirty later translators have not stripped this noble hymn of all its dignity. The Veni Creator Spiritus must not be confounded with another hymn to the Holy Ghost, Veni Sancte Spiritus, Et emitte coelitus, the 'Golden Sequence,' which ranks among the masterpieces of Latin sacred poetry. The latter belongs not to the Breviary, but to the Missal, in which it forms a Sequence in the Mass of Pentecost Sunday and Octave. It is in five stanzas, each consisting of six lines of seven-syllable trochaic verse. It is certainly not older than the beginning of the 13th century. It has been variously ascribed to King Robert II. of France, to Hermannus Contractus, to Stephen Langton, and, with perhaps most probability, to Pope Innocent III. The best translations are those by Caswall and by Neale.

Venlo, a Dutch town on the Meuse, close to the German frontier, and an important railway centre, 20 miles W. of Crefeld, with manufactures of needles, cigars, and gin. The fortifications that some ten times endured siege and capture were removed in 1868. Pop. (1888) 10,815.

Venn, HENRY, an eminent English evangelical, was born of a clerical family at Barnes in Surrey, March 2, 1724. He studied at Jesus College, Cambridge, taking his degree in 1745, and became Fellow of Queen's College in 1749. After holding several curacies he was appointed to that of Clapham in 1754, but resigned in 1759 to become vicar of Huddersfield in Yorkshire, whence in 1771 he removed to the vicarage of Yelling in Huntingdonshire. He died in the house of his son, John Venn, rector of Clapham, June 24, 1797. The holiness of his life, his broad sympathies, and earnest zeal gave him wide influence even in that barren and unspiritual age. He was an indefatigable preacher, often delivering as many as ten sermons a week. His two books were *The Complete Duty of Man* (1763) and *Mistakes in Religion* (1774).

His Memoir by his son, together with his *Correspondence*, was edited by his grandson, the Rev. Henry Venn (1834). See Bishop Ryle's *Christian Leaders of the Last Century* (1869), and the study by W. Knight (1881).

Venomous Bites. The most important group, snake-bites, the poison contained and the antidote, have been already treated at SNAKES. Others will be found dealt with under the heads of the creatures that inflict them—as at SCORPION, BEE, ANT, HORNET, WASP, TARANTULA, TSETSE, &c. The number of insects actually poisonous is few; in ants, bees, and wasps there is real venom (formic acid); but many injurious insects annoy otherwise than by injecting poison into the wound (see BOT). The pain of the mosquito bite is probably due to the sawing motion of his proboscis. But any biting insect, such as a gadfly, may, if it have formerly settled on a festering carcass, carry and inject into a delicate skin a deadly poison not its own; deaths have occurred from this cause in England. See POISON, STINGING-CELLS, WOUND.

Venosa, a town of South Italy, 25 miles N. of Potenza, with a ruined castle, an old abbey, a venerable church, and catacombs. Pop. 8014. It was the ancient *Venusia*, Horace's birthplace.

Ventilation, artificial renewal of the air within a confined space, such as a mine or the interior of a building or vessel. This is required when the air is subject to contamination, as by products of respiration or by admixture with other gases. In a mine it is necessary to renew the air in order to carry off the products of respiration of men and horses, the products of combustion of lamps, and, in coal-mines, the inflammable gas which oozes from coal or rushes from 'blowers,' and causes risk of explosions. In general there are two leading methods of ventilation: (*a*) causing air to go out at the outlet, and allowing air to find its way in by any inlet (*vacuum method*); (*b*) forcing air in and allowing it to find its way out (*plenum method*). The advantage of the second method is that it is known whence the air comes which is forced in, and the access of air from other sources tends to be prevented by the excess of pressure within the confined space. In most cases, however, the vacuum method is much more easily applied.

In mines there are two main methods of applying the vacuum method: (*a*) by a furnace at the bottom of the upcast shaft; (*b*) by a vacuum fan at the top of that shaft. In both cases the actual quantity of air which is caused to travel up the upcast shaft must be sufficient to sweep away and sufficiently dilute all the mischievous admixtures in the workings; and the 'draught' must be sufficient to overcome the very considerable friction encountered by the air as it passes through the air-ways. This friction varies at each spot as the square of the velocity there; and therefore it is necessary to arrange the air-ways so as, with a given flow, to have the least velocity possible upon discharge into the outer air. When a furnace is used, air is heated by it and becomes light; it therefore tends to ascend in the shaft; other air takes its place from the workings; and a continuous current is thus set up, the fresh air entering by the downcast shaft. A furnace is, however, somewhat dangerous, for the air from the workings may, upon reaching it, be unsafely charged with gas and coal-dust; and during recent years powerful exhaust fans, like centrifugal pumps (see PUMPS), have been largely employed. The velocity for a given flow is lowest when the air-ways are wide, and the velocity at any point of the workings is less the more numerous the air-ways. The flow through the workings is regulated by opening and closing air-doors or putting up barriers. If the flow through the workings is too much obstructed, the actual outflow of air being maintained by driving the engine hard, the pressure within the air-ways may be so far diminished that gas is exhausted from the coal-seam. In mines water-gauges are employed in order to test the local pressures in the workings; one limb of a U-tube containing a little water is connected with the 'dumb-drift,' and thereby with the upcast shaft; the other limb is open to the air-way; the movement of the water in the U-tube, taken along with the readings of the instruments in the upcast-shaft, indicates the suctional variations of pressure in the workings. The velocity is measured by anemometers, which are often made to signal their readings by electric transmission. Barometers and thermometers are also used in order to supply data for the requisite corrections and adjustment of quantity of air to be set in motion. Besides furnaces and fans, steam and air-blasts have been used in order to force air along; but these waste much power. In ore-mining the fresh and chilled air liberated from compressed-air motors at the working face is often very useful as a means of ventilation by the plenum method at the very point where air is most needed.

In regard to buildings and dwellings the greater care now taken in making doors and windows air-tight makes it more necessary than it formerly was to provide proper means of removing vitiated air and supplying fresh. In the old House of Commons Sir Christopher Wren made the chamber

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communicate by means of tubes with an upper room into which the heated air went while the cold air from that room flowed down; this produced draughts. In 1723 Dr Desaguliers lit fires in the upper room; these fires heated the ventilating tubes from the chamber below, and caused air to ascend in them. He afterwards used a centrifugal blowing wheel, turned by a man, to effect the same purpose. Before 1744 Dr Stephen Hales proposed to use bellows for driving air into a room or a ship, or for expelling it; these being sometimes worked by a roof windmill. In 1749 Mr Samuel Sutton proposed the simple use of an open fire, the air-supply of which is wholly drawn from the interior of a building or the hold of a ship. Count Rumford proposed to take the air-supply of a building down from the roof by means of an air-shaft; a plan which implied that the fire must be kept burning, and extraneous air excluded. In 1811, at the House of Lords, Sir Humphry Davy admitted air, heated if necessary, by numerous apertures in the floor, and used Dr Desaguliers' mode of extraction, but his exit-pipes were too small, and the plan failed. About 1818 the Marquis de Chabannes wrote upon the ventilation of rooms. He proposed the admission of air by tubes heated by the fire, open to the outer air at one end and to the room at the other; and he proposed a chimney ventilator to remove the vitiated air, and also ventilating lamps and ventilating gas-fittings to carry off not only the products of their own combustion, but also an additional quantity of air, through special channels. In the House of Commons he applied steam-heat near the ceiling to warm the air and produce ascending currents. In 1834 Dr Reid of Edinburgh introduced, at the temporary House of Commons built after the fire, the principle of a much larger exit area than had previously been thought necessary. The vitiated air was drawn through a furnace and up a high chimney. There were very numerous apertures of admission for the air, which was filtered from dust, and warmed or cooled, dried or moistened, as might be required. The temperature was regulated by mixing highly heated air with an adjustable quantity of cold air in a mixing and equalising chamber before allowing the mixture to enter the House. Mr Gurney, in the new buildings, made the windows capable of being opened, introduced steam-heating, and took in the air at a low level instead of from the top of a tower as Dr Reid had done at first.

The products of combustion and respiration, comprising carbonic acid, water-vapour, and a small quantity of anthropotoxin (which is a virulent poison when concentrated), are rapidly diffused throughout the air of a room; and more air ought to enter a room, in order to dilute these, than is actually necessary in order to supply the requisite oxygen. The quantity of air required per head per minute has been very variously stated; the figure now usually stated is between 20 and 30 cubic feet per head per minute. The inflowing air should never be allowed to make sharp draughts across a room; for this reason it is frequently much safer to open a window widely than it is to open it a little; but the inflowing stream may be broken up so as to diminish its velocity as far as is consistent with adequate flow. For this purpose perforated zinc, perforated glass, wire gauze, sliding valves, air-bricks, and similar devices may be used; or the velocity may be practically diminished by directing the incoming stream of air towards the ceiling as by louvre ventilators in the window, or by Tobin's tubes. In these, when there is any withdrawal of air from the room, its place is taken by air directed in an upward stream through tubes whose upper end is open at a height of about 6 feet within the room, while the other end is open to the external air-supply at a lower level. In Sir Douglas Galton's grate there is an air-chamber behind the fire, which is continued into an air-flue above. The air-chamber is connected with the outer air; air is heated in the chamber and flue, and leaves the flue, passing into the room near the ceiling; fresh air enters the chamber from outside, and a continuous supply is thus kept up; warm air enters the room, and cold draughts are prevented. In Pierce's stove air from outside flows round the fire within an open stove; it enters the room through a perforated grating at the top, ascends to the ceiling and circulates there. There is still a good deal of divergence of opinion as to whether air should be admitted at the top or the bottom of an apartment. Neither method is entirely free from objection. Cold air admitted at a low level never allows the lower part of the room to become warm; this might, however, be an advantage in sultry weather. Cold air admitted at a high level brings the products of combustion down to be breathed over again. Mr Dye argues in favour of bringing in fresh air, if cold, at an intermediate height, just above people's heads.

For extraction of the vitiated air the open fireplace is to some extent effective even in summer time, for the chimney long remains slightly warm; but the current of vitiated air is better directed, not past the persons in the room, but towards the ceiling, and taken off by a grating opening into the chimney. When this is done down-draughts must be checked by a valve, the fireplace must not be too wide or open, and the chimney itself must not be too narrow. The fault of an open fireplace is in general that when the fire is lit it extracts more air than it is necessary to extract for ventilation purposes, and the air-supply must come in partly through the house or down some other chimney, or may fail to find its way in at all, in which case the chimney smokes. During recent years a great deal of attention has been paid to utilising the motive power of gas-flames as a means of ventilation. In the Paris Gas Company's cooking demonstration rooms in the Rue du Quatre-Septembre, 28, ventilation by this means is said to have been most successfully carried out. In every case a sufficiently large exit-channel ought to be provided, and this is a point apt to be overlooked.

The reader may consult Dr Reid's *Illustrations of the Theory and Practice of Ventilation* (Longman, 1844); Ritchie's *Treatise on Ventilation*; Tomlinson's *Rudimentary Treatise on Warming and Ventilation*; the chapter on Ventilation in Dye's *Hood on Warming Buildings* (Spon, 1891); Edwards on *Ventilation and Heat* (Longmans, 1881), a work to which we are largely indebted for our historical retrospect of the subject, and which contains numerous useful illustrations; and also Alan Bagot's *Colliery Ventilation* (Kegan Paul, 1882).

Ventimiglia, a small fortified town of the Italian Riviera, near the French frontier, and 3 miles E. of Mentone by rail. It has a cathedral and seminary, a small harbour, and a number of forts. Pop. 4195.

Ventnor, the principal town on the south shore of the Isle of Wight, 11 miles by rail S. by W. of Ryde. Situated amid the finest of the fine scenery of the Undercliff, it has a southern exposure, well sheltered from the north, and so possesses a mild climate, suitable for various classes of invalids. Hence from a small fishing-hamlet it has grown since 1830 to a favourite watering-place, with an esplanade (1848), numerous hotels and lodging-houses, and the National Consumption Hospital (1872). The beach is composed of beautiful yellow shingle; and fossils are found in great quantity in the vicinity. Pop. (1861) 3208; (1891) 5817. See works cited at WIGHT (ISLE OF).

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Ventriculites, fossil sponges found in the Cretaceous System (q.v.), and often giving their shape to flint nodules.

Ventriloquism, the art of producing tones and words without any motion of the mouth, so that the hearer is induced to refer the sound to some other place. It does not depend on any peculiar structure of the organs of voice, but upon practice and dexterity. The name is founded upon the mistaken supposition that the voice proceeds from the belly. The art of the ventriloquist consists mainly in taking a deep inhalation of breath, and then allowing it to escape slowly; the sounds of the voice being modified and muffled by means of the muscles of the upper part of the throat and of the palate. The ventriloquist avails himself at the same time of means such as are employed by sleight-of-hand performers to mislead the attention. Ventriloquism is a very ancient art; the Greeks ascribed it to the operation of demons, and called ventriloquists *Engastrimanteis* ('belly-prophets').

Venue, the district from which a jury comes to try a question of fact; this, according to English law, should be the county where a crime is alleged to have been committed or a cause of action to have arisen, but modern rules permit civil cases to be set down wherever they may most conveniently be tried. In criminal cases, if a fair trial cannot be had in the county where the venue is laid, the High Court may change the place of trial. A similar power has often been conferred by statute on the Irish courts, when there has been reason to apprehend that a local jury would be liable to intimidation or undue influence.

Venus, originally a Roman goddess of spring, patron of flower-gardens, was subsequently identified with the Greek Aphrodite (q.v.), and so became also the Roman goddess of Love. In this capacity she is first heard of about 217 B.C. But over and above her cult as love-goddess she was worshipped by the Romans as *Dea Genetrix*, mother of the race, on account of her being the mother of Æneas (q.v.). She was also regarded as the tutelary goddess of the city of Rome, and as the ancestress of the Gens Julia. Hadrian built her a great temple in the Forum. Her sacred day was the 1st April. The ideal beauty of Venus was that created for the Greek Aphrodite; the famous statues of Venus are in fact Aphrodites. Most famous was that by Praxiteles at Cnidus, of which there are ancient copies at Munich and elsewhere. Of the great originals still extant by far the noblest is the Venus of Melos ('di Milone'), now in the Louvre, which was found on the island of Melos in 1820; the author and date are unknown. Next most famous are the Venus of Capua, at Naples; the Venus de Medici, now at Florence, but found at Rome near Tivoli in the 18th century, and long kept at the Villa Medici; and the crouching Venus of the Vatican. For the planet Venus, see PLANETS; and for the transits of Venus, see SUN. Venus' Flower-basket is one of the Sponges (q.v.); Venus' Fly-trap, one of the Insectivorous Plants (q.v., p. 164); and Venus' Girdle, one of the Ctenophora.

Venusberg. See TANNHÄUSER.

Venus' Looking-glass (*Specularia speculum*), a very pretty little annual, of the natural order Campanulaceæ, which has long been a favourite in flower-gardens, and is a native of cornfields in the south of Europe. It has brilliant blue, white, or violet-coloured flowers, which fold up in a pentagonal manner towards evening. There are seven or eight other species, one a native of Britain (*S. hybrida*), all being pretty, neat herbs.

Vera, AUGUSTO, philosopher, was born 4th May 1813 at Amelia in Umbria, studied at Rome and Paris, and, after teaching philosophy in France for thirteen years, lived in England from 1851 to 1860. From 1862 till his death (13th July 1885) he was professor at Naples University. He is known chiefly for his translations of Hegel's works into French, and for having introduced Hegel into Italy. But he wrote much on many subjects—on Plato's doctrine of immortality, on Strauss, on Cavour, on capital punishment, and, in English, an *Inquiry into Speculative and Experimental Science* (1856) and an *Introduction to Speculative Logic and Philosophy* (St Louis, 1875). See a monograph by Mariano (Naples, 1887).

Vera Cruz, the principal port of Mexico, lies on the east coast, in a low, unhealthy plain, backed by drifting sandhills, 263 miles by rail E. of the capital. There is no harbour, but only an open roadstead between the city and the island castle of San Juan de Ulua, which, with two shore batteries, defends the port. The streets are wide and straight, with numerous squares, and low, picturesque houses of various colours. The chief buildings are the cathedral, custom-house, and casino; a number of the churches have been perverted into tobacco-factories. The moist, hot climate of Vera Cruz is notoriously unhealthy, and the annual death-rate ranges from 1 in 11 to 1 in 20 of the population, mostly from lung diseases, and from yellow and other fevers. The fierce 'northers,' if they often drive vessels ashore from the exposed anchorage, at least are of use in sweeping away the fevers for a time. Most of the commerce is in the hands of foreigners; nearly 600 vessels enter and clear annually. Pop. 24,000.—The full title of the city is *Villa Nueva de la Vera Cruz*, or 'New City of the True Cross.' The old town was founded by Cortes in 1520 on the spot where he had landed the year before; the new one dates from 1580. The royal forces held out in the castle till November 1825. The castle capitulated to the French in 1838, and to General Scott in 1847; and during the French occupation the town was the base of supplies from 1862 to 1867.

Veratrine. See SABADILLA.

Veratrum. See HELLEBORE.

Verbena, a genus of plants of the natural order Verbenaceæ. The genus consists of numerous species of herbs or shrubs which inhabit the tropical and subtropical parts of the world; most numerous in America, more rare in Asia and Africa. One species, the Common Vervein or Vervain, is a native of the southern counties of England, and is occasionally met with in Ireland and in Scotland. They have opposite leaves, sessile bracteated flowers in simple or panicled spikes, terminal or axillary; a tubular five-toothed calyx, tubular corolla more or less curved with a spreading limb, generally unequally lobed; four stamens, included in the tube, the upper pair sometimes without anthers; a slender style with capitate stigmas. The ripe fruit splits into two or four nutlets, each containing one seed. The genus is more remarkable for the beauty of a number of the species, which under cultivation have given origin to numerous varieties greatly prized for their brilliant coloured flowers, than for other virtues, although formerly

Verbena officinalis.

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the British species was credited with potent medicinal qualities, particularly in ailments of the bladder and in the cure of defective vision, which, however, appear to have been purely imaginary. It was also worn on the person as a protection against blasts and to promote general good-fortune, for which purpose it was gathered with special observances and ceremony. The Lemon-scented Verbena is *Aloysia citriodora*, which belongs to the same natural order; but the perfumers' Oil of Verbena is derived from the Lemon-grass (q.v.).

Verbenaceæ, a natural order of gamopetal plants, consisting chiefly of trees and shrubs, but partly also of herbaceous plants. The leaves are generally opposite and simple, and have no stipules; the flowers are generally in corymbs or spikes. The order contains fifty-nine genera and about 740 species, chiefly tropical, some of them natives of temperate countries. The Verbenaceæ are allied to Labiatæ both in botanical characters and in properties, but the leaves have no oil-glands. Some are beautiful ornaments of gardens and hothouses; some are esteemed for their fragrance; some are used in medicine; the fruit of some species, as *Premna esculenta* and species of Lantana, is eaten; the leaves of *Stachytarpheta jamaicensis* are used as a substitute for tea; and the timber of a number of species (e.g. teak) is valuable.

Verboeckhoven, EUGEN JOSEPH (1799–1881), a Flemish painter of animals, specially noted for landscapes with sheep.

Vercelli, an ancient but thriving town in North Italy, 40 miles SW. of Milan by rail, with several old churches, a modern cathedral, and manufactures of machinery, candles, matches, soap, and musical instruments. Pop. 20,165. Among the important MSS. in its libraries are an ancient Latin version of the four gospels, and the 'Vercelli Book,' a mutilated but invaluable collection of the remains of Anglo-Saxon literature, made probably about the time of Edward the Confessor, but discovered by Dr Blume at Vercelli in 1823. It contains six homilies and six poems; and a transcript was published for the Record Commission in 1836. The more important poems, *St Andrew* and *The Finding of the Cross*, have been separately edited.

Vercingetorix. See ALESIA, and CÆSAR.

Verd, CAPE. See CAPE VERD.

Verde-antique, a beautiful stone of a dark-green colour, with patches of white, and sometimes also black and red. It is a mixture of serpentine with limestone dolomite or magnesite, and was much prized by the ancient Romans, and is still in great favour in Italy. Oriental verde-antique is a green porphyry having much the same structure and texture as rosso antico (see PORPHYRY).

Verden, a town of 8600 inhabitants in the Prussian province of Hanover, on the Aller near its junction with the Weser, and 20 miles SE. of Bremen by rail. It has an old Gothic church of 1290–1490, and is noted as the place where in 782 Charlemagne massacred his Saxon captives.

Verdi, GIUSEPPE, the last and most widely successful of the school of Italian opera proper, was born at Roncole near Busseto, October 9, 1813. At ten years he was organist of the small church in his native village, the salary being raised after a year from £1, 8s. 10d. to £1, 12s. per annum. At the age of sixteen he was provided with funds to prosecute his studies at the conservatorium at Milan; but at the entrance examination he showed so little evidence of musical talent that the authorities declined to enrol him. Nothing daunted, he pursued his studies with ardour under Lavigna from 1831 to 1833, when, according to agreement, he returned to Busseto to take the place of his old teacher Provesi, now deceased. After five unhappy years in a town where he was little appreciated, Verdi returned to Milan. His first opera, *Oberto, Conte di S. Bonifacio*, is chiefly indebted to Bellini, and the next, *Un Giorno di Regno* (which fulfilled its own title, as it was only once performed), has been styled 'un Bazar de Reminiscences.' Poor Verdi had just lost his wife and two children within a few days of each other, so it is hardly to be wondered at that a comic opera was not a very congenial work, nor successfully accomplished. *Nabucodonosor* (1842) was his first hit, and in the next year *I Lombardi* was even more successful—partly owing to the revolutionary feeling which in no small degree was to help him to his future high position. Indeed his name was a useful acrostic to the revolutionary party, who shouted 'Viva Verdi,' when they meant 'Viva *V*ittorio *E*manuele *R*e *D'I*talia.' *Ernani*, produced at Venice in 1844, also scored a success, owing to the republican sentiment in the libretto, which was adapted from Victor Hugo's *Hernani*. Many works followed in quick succession, each rousing the enthusiasm of the audiences chiefly when an opportunity was afforded them of expressing their feelings against the Austrian rule. Only with his sixteenth opera did Verdi win the supremacy when there were no longer any living competitors; and *Rigoletto* (1851), *Il Trovatore*, and *La Traviata* (1853) must be called the best as they are the last of the Italian Opera school. *I Vespri Siciliani* (1855) and *Simon Boccanegra* (1857) were not so successful as *Un Ballo in Maschera* (1859); and none of them any more than *La Forza del Destino* (1862) or *Don Carlos* (1867) added anything to the fame of the composer of *Il Trovatore*. Only now begins the interest which the student of musical history finds in Verdi's life. Hitherto he had proved a good man struggling with adversity and poverty, a successful composer ambitious to succeed to the vacant throne of Italian opera. But the keen insight into dramatic necessity which had gradually developed and had given such force to otherwise unimportant scenes in earlier operas also showed him the insufficiency of the means hitherto at the disposal of Italian composers, and from time to time he had tried to learn the lessons taught in the French Grand Opera school, but with poor success. Now a longer interval seemed to promise a more careful, a more ambitious work, and when *Aïda* was produced at Cairo (1871) it was at once acknowledged that a revolution had taken place in Verdi's mind and method, which might produce still greater results. The influence of Wagner and the music-drama is distinctly to be felt, and the advantage of more deliberate work. But Verdi was apparently not yet satisfied. For sixteen years the successful composer maintained absolute silence in opera, when whispers of a great music-drama roused the expectation of musical Europe to an extraordinary pitch; nor were the highest expectations disappointed when *Otello* was produced at Milan in 1887. The surrender of Italian opera was complete, and Verdi took his right place at the head of the vigorous new school which has arisen in Italy and which promises to regain for the 'Land of Song' some of her ancient pre-eminence in music. A comic opera by Verdi, *Falstaff*, was announced in 1892; a Requiem Mass (1874) is his only important non-operatic work.

A sketch written by Caponi, and personal reminiscences by Giulio Ricordi, have furnished Signor Mazzucato with much that is interesting in a full, but over enthusiastic, article in Grove's *Dictionary*. Hanslick's brilliant, but unjustly severe, critique in his *Moderne Oper* (Berlin, 1885) more than restores the balance. See also Pougin's *Life of Verdi* (Lond. 1887).

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Verdict. See JURY, CRIMINAL LAW.

Verdigris is a basic acetate of copper, or rather it is a mixture of three such acetates. This substance has long been largely made at Montpellier in France, by exposing thin sheets or strips of copper to the vapour of acetic acid arising from fermenting grape skins. Verdigris is used by itself as a green pigment, and also in the manufacture of several other green colours. It was in use as a paint by the ancient Romans, and it has continued to be employed as such to the present time. But as it suffers from exposure to impure air, and acts injuriously on some other pigments if mixed with them, it has fallen very much out of use for artistic work. Mixed with white-lead, it is largely used in Russia for painting iron roofs, the mixed paint changing by exposure from a bluish to a fine green colour. External wood-work is coated with it in Holland, partly, perhaps, because it is a good preservative of timber. It is mixed with some dark colours as a 'drier,' and is employed as an external application in surgery. Verdigris is very poisonous, and as it has a tendency to form on copper cooking-vessels they should always be kept perfectly clean.

Verditer. This pigment is a hydrated oxide of copper formed by adding lime to a solution of a salt of this metal, such as the nitrate, when a blue precipitate is thrown down. This blue verditer is scarcely injured by light, but it is blackened by impure air. It is used in common distemper painting and in paper-staining. Green verditer is the blue pigment changed to green by boiling, but it is a colouring substance of little value.

Verdun, a fortified French town in the department of Meuse, 35 miles W. of Metz by rail. It has eleven forts, a cathedral, and manufactures of iron, liqueurs, sweetmeats, leather, and beer. Pop. (1891) 18,195. In 843 a famous treaty was made here between the Emperor Lothaire and his brother Ludwig the German, by which the Frankish empire was divided in three (see FRANCE, p. 778). The fortress has been often besieged; as it was in 1870 by the Germans for six weeks, when it capitulated. It was the last place held by Germany, given up only in September 1873.

Vere. See CAMPVERE.

Vere, AUBREY THOMAS DE, poet, was born 10th January 1814, the third son of Sir Aubrey de Vere of Currah Chase, County Limerick, who was himself a poet. He was educated at Trinity College, Dublin, and embraced the Roman Catholic faith about 1851. He has written a long series of poems, beginning with *The Waldenses* (1842), which show much grace and beauty, if little strength. Many of these are devoted to native Irish legends, especially those religious. His poetical works were collected in 3 vols. in 1884. Other works are on the picturesque aspects of Greece and Turkey, on the English government of Ireland, on church questions, and especially a series of excellent studies on Wordsworth, Landor, Shelley, Keats, &c.—*Essays: chiefly on Poetry* (2 vols. 1887).

Vere, SIR FRANCIS, soldier, was born probably in 1560 at Crepping or Crustwick, son of the fourth son of the 15th earl of Oxford. The family of Vere was one of the most ancient and famous in England; its head was hereditary Grand Chamberlain. The earldom of Oxford was created in 1137, and continued unbroken through twenty earls down to 1703. The home of the family was the valleys watered by the Colne and Stour—the borderland of Essex and Suffolk; the chief seat was Hedingham, the great keep of which is the finest relic of Norman civil architecture in England; their burial-place was the priory of Earl's Colne, 7 miles down the river.

Francis Vere obtained a company in the Bergen-op-Zoom garrison in the autumn of 1586, and won his first laurels in the memorable siege of Sluys, being knighted by Lord Willoughby at its close. Him he succeeded in August 1589 in the chief command in the Netherlands, with the rank of sergeant-major general. His spirit and courage even when desperately wounded made him a soldier's hero, while his skill and energy as a captain at Breda, Deventer, and a hundred fights carried his fame far beyond the Netherlands. He shared the glory of the Cadiz expedition (1596) as lieutenant-general and lord-marshal, and also next year the failure of the Island Voyage, the only laurels in which fell to his bitter rival Raleigh. Again in Holland, he governed Brill, and helped Maurice to victory at Turnhout (1597) and Nieuwpoort (1600), as well as in the heroic defence of Ostend. He died in London, 28th August 1609, and was buried in Westminster.

His brother, HORACE, LORD VERE, was born in 1565, and at twenty went with Francis to the Netherlands, and took a hero's share in all his battles. Knighted for his courage at Cadiz, he succeeded his brother as governor of Brill, and at the beginning of the Thirty Years' War was sent by James I. to defend the Palatinate. But he was shut in at Mannheim and forced to surrender to Tilly (1623). He was created Baron Vere of Tilbury in 1625, and died suddenly at Whitehall, 2d May 1635. Fuller describes him as having 'more meekness and as much valour as his brother. . . . Sir Francis was more feared, Sir Horace more loved, by the soldiers.'—Another brother, ROBERT, died in the Netherlands on the battlefield, after but six years of service (1595). See Clements R. Markham, *The Fighting Veres* (1888).

Verestchagin, VASILI, painter, was born, 26th October 1842, at Tcherepovets in the government of Novgorod, and studied at the Naval School in St Petersburg, becoming an officer in 1859. He subsequently gave himself to art, and, after a sojourn in Tiflis, became a pupil of Gérôme at Paris. In 1867 he was with Kauffmann in the Turcoman campaigns, the fruits of which he put on canvas in Munich; and he reaped a richer artistic harvest from a visit to India in 1874. Still more famous were his painfully realistic pictures of the horrors of the fightings, plunderings, amputations, and battlefields cumbered with mutilated corpses of the Russo-Turkish war of 1877. In 1884 he made another journey to India, visiting by the way Syria and Palestine; and subsequently produced a series of striking but anticonventional pictures of the life of Christ and other sacred themes. He has painted also gigantic pictures of the execution of mutinous sepoys by English soldiers, and of Nihilists by the Russian authorities. As an author he has given us autobiographical sketches of his travels (Eng. trans. 1887). *At Home and in War* (Eng. trans. New York, 1888) is by his brother Alexander Vasilievitch Verestchagin.

Verga, GIOVANNI, novelist, was born at Catania in Sicily in 1840. Of his numerous novels and tales, some of which illustrate the humours and passions of country life (as *La Vita dei Campi*, 1880, and *Novelle Rusticane*, 1883, from which comes the story of Mascagni's opera, *Cavalleria Rusticana*), the first to be translated was *The House by the Medlar Tree* (by Craig, preface by Howells, New York, 1890).

Vergennes, CHARLES GRAVIER (1717–87), French statesman, who, after a diplomatic career in Germany, Turkey, and Sweden, became Louis XIV.'s minister of foreign affairs, and, adopting the deliberate policy of humbling England by pro-

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noting the independence of the United States, concluded the alliance of 1778. See his *Vie Publique et Privée* by Mayer (Paris, 1789), and Diniol, *La Participation de la France à l'Établissement des États Unis* (1889).

Vergil. See VIRGIL.

Vergil, POLYDORE, otherwise named De Castello, was a native of Urbino in Italy, born about 1470. He had his education at Bologna, and seems to have commenced life under the patronage of Guido Ubaldo, Duke of Urbino, to whom was dedicated his first work, *Proverbiorum Libellus* (Ven. 1498), an earlier book than the *Adagia* of his friend Erasmus. His second, *De Inventoribus Rerum* (Ven. 1499), was also the earliest book of its kind, became extremely popular, and was translated into English, Spanish, and Italian. Already chamberlain to Pope Alexander VI., Polydore Vergil was sent to England in 1501 as deputy-collector of the tribute called Peter's-pence, his superior in the office being his kinsman, Adrian de Castello, now Cardinal Sti. Chrysogoni, and soon after Bishop of Hereford. Polydore was presented to the living of Church Langton in Leicestershire in 1503, and next year was enthroned as the Bishop of Hereford's proxy on his translation to the see of Bath and Wells. In 1507 he was collated to the prebend of Scamblesby in Lincoln, in 1508 was nominated archdeacon of Wells, was naturalised in 1510, and collated to the prebend of Oxgate in St Paul's in 1513. Early in 1515 he was flung into prison for sending abroad slanderous letters about Wolsey, but apparently was soon released, whether from the entreaties of Leo X. and the Cardinal de Medicis or his own abject appeals to Wolsey. In 1525 he published the first genuine edition of Gildas, the year after the treatise *De Prodigiis*, dialogues in attack upon divination. His *Historiæ Anglicæ Libri XXVI.* appeared at Basel in 1534; the 27th book, bringing the story down to 1538, was added in the third edition (1555). About 1550 he obtained a license from Edward VI. to return to Italy for his health's sake, without losing his livings, and next he travelled to Urbino, where he lived in quiet till his death in 1555.

Polydore Vergil's History is a work of great research, vigorous and independent, written in clear and elegant Latin. It is the fullest original narrative for the reign of Henry VII., and here Hall has simply translated his Latin into English. As regards Wolsey, the value of his evidence is discounted by his strong prejudice. He spared no pains to ensure accuracy, and a strongly rational bias of mind hindered him from accepting the Scottish fables supplied him by Gavin Douglas, or the exploits of Brut and Arthur warranted by Geoffrey of Monmouth.

The work down to Richard III. was translated in the 16th century; and books xxiii.-xxv., relating to the reigns of Henry VI., Edward IV., and Richard III., were republished in 1844 by the Camden Society, with a preface by Sir H. Ellis. Another Camden Society issue, by the same editor, was the translation of the first eight books, coming down to the Norman Conquest (1846).

Vergniaud, PIERRE VICTURNIEN, one of the greatest orators of the French Revolution, was born at Limoges, 31st May 1753, the son of an unprosperous merchant there. Turgot, then intendant of the Limousin, divined his promise, and nominated him to a bursarship at the Collége du Plessis at Paris. He studied divinity aimlessly at the Sorbonne, but soon grew tired of it, next took a post in the civil service at Paris, but ere long threw it up and retired to his bankrupt father's house at Limoges. But a brother-in-law helped him to settle as an advocate at Bordeaux in 1781, and he quickly gained a great practice, and was elected a deputy to the National Assembly in 1791. His splendid eloquence, the charm of his personality, made him the leader of the Girondists, but he was too indolent and unambitious to care for political intrigue, and indeed he was far more of the orator than the statesman. Sent to the Convention by the department of the Gironde, he supported, in the question of the king's trial, the proposal of Salle to make an appeal to the people. When the decisive moment came he voted for death, and as president it was his duty to announce the result. In the struggle with the Mountain he made a splendid effort, but too late. He was guillotined 31st October 1793, the last of the twenty-one who died together.

See Vatel, *Vergniaud: Manuscrits, lettres et papiers* (2 vols. 1875); Aulard, *Les Orateurs de la Législative et de la Convention* (vol. i.); and the Lives by Touchard-Lafosse (1848) and Verdière (1866). See also vol. i. of H. Morse Stephens, *The Principal Speeches of the Statesmen and Orators of the French Revolution* (1892).

Verjuice (Old Fr. *verjus*, 'juice of green fruit'), a vinegar formerly much used, made from sour cider, or from the juice of the wild crab-apple. The expressed juice of unripe grapes is another kind of verjuice used in the vine districts. Both are occasionally employed in cooking.

Verkhoyansk, a small town (pop. 300) of Siberia, on the Yana River, 400 miles NE. of Yakutsk, one of the coldest places on the earth. See TEMPERATURE.

Verlaine, PAUL, French poet, was born at Metz, 30th March 1844, and chose French nationality in 1873. He began his course with *Poèmes saturniens* (1865), *Les Fêtes galantes* (1869), and *La bonne Chanson* (1870). Then followed a dozen years of silence, of Bohemianism, of the hospitals, and of Villon-like adventures, round which legends enough have already clustered. His next work, *Sagesse* (1881), breathed penitence and devotion in verse of singular sweetness, which Jules Lemaitre makes bold to compare with the *Imitation* itself. *Les Poètes Maudits* (1884), a volume of literary criticism, was followed by *Jadis et Naguère* (1885), *Romances sans Paroles* (1887), *Amour* (1888), *Bonheur* (1889), and *Parallèlement* (1890), the last a strange collection, the poet singing alternately perverse sin and religious repentance. As a perfect mirror of human impressions Verlaine's lyrics are unequalled in modern France, and many show a marvellous mastery over novel forms of rhythm.

Vermejo, an affluent of the Paraguay (q.v.).

Vermés (Lat., 'worms'), the name given by Linnæus to one of the classes in his zoological system, in which he included all the invertebrate animals, other than Insecta, whether of worm-like form or not. The Linnæan class has since been divided into many classes, and the term Vermes is no longer used. See WORMS.

Vermicelli. See MACARONI.

Vermifuges, also called VERMICIDES, or ANTHELMINTICS, are remedies which possess the property of destroying intestinal worms, or of expelling them from the digestive canal. Those in most common use at the present day are, for Tape-worms, extract of male-fern root, in doses of half to one teaspoonful, and turpentine in doses of one to two tablespoonfuls; for Round-worms (*Ascaris lumbricoides*, q.v.), Santonin (q.v.); and for Thread-worms (q.v.), santonin and saline cathartics by the mouth, but particularly injections (see CLYSTER) by the rectum of common salt, strong green tea, infusion of quassia, or diluted steel drops.

Vermilion (sulphide of mercury, Hg, 87; S, 13) exists in the native state as Cinnabar (q.v.), from which this beautiful red pigment is obtained by selecting pure pieces and simply grinding them.

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It is, however, generally made artificially. By one dry process the first step is to prepare an intimate mixture of 100 parts of mercury and 18 parts of sulphur, which are agitated together in revolving vessels until they have combined. The powder so obtained is afterwards sublimed in specially constructed retorts, and the purest portion condensed on the heads of the retorts is then treated with a little caustic potash, and washed with warm water. One of several wet processes in use for making vermilion consists in combining mercury and sulphur by grinding them together in the presence of water, caustic potash being afterwards added, and the mixture triturated for some hours at a temperature of 113° F. The product is afterwards thoroughly washed. The Chinese have long made beautiful vermilion. See PIGMENTS, and RED.

Vermin (Fr. *vermine*, through *vermineus* from Lat. *vermis*, 'a worm'), a worm or grub; more usually obnoxious insects, as bugs, fleas, and lice; troublesome animals, such as mice, rats; animals destructive to game, such as weasels, polecats, also hawks and owls. Badgers and otters come under this name; and the fox is called vermin, but without disrespect. See the articles on the various animals named; also INSECT-POWDER.

Vermont', the only entirely inland state of New England, received its name from its mountains (Verd Mont). It lies west of New Hampshire, with Canada on the north, Massachusetts on the south, and New York and Lake Champlain on the west. Its length from north to south is 140 miles, its width from 40 to 90 miles; area, 10,200 sq. m. The Green Mountains extend its entire length, being divided in the northern part, and forming a second range. Four peaks rise beyond 4000 feet above sea-level. The surface of the state is broken by many hills. The mountains are mostly clothed with trees to their summits. The hills furnish the best of pasturage, and, for the most part, can be cultivated to their tops. The air is pure and invigorating, and the scenery varied and beautiful. The average temperature is from 40° to 47° F., and the rainfall from 30 to 40 inches.

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Vermont is rich in quarries of granite, marble, and slate, which are extensively worked. Many of the rocks contain lime, and by disintegration make a strong soil. Steatite, verd-antique, sulphuret of iron, manganese, kaolin, and iron exist. Agriculture is the prevailing industry, and manufactures are comparatively few. A larger area is devoted to the raising of cereals—barley, buckwheat, Indian corn, oats, rye, and wheat—than in any other New England state. Its annual product of maple sugar exceeds that of any other state, and is nearly one-third of the total product of the country. By reason of the richness of the pasturage, the butter and cheese produced is of a superior quality.

The state is divided into fourteen counties, and returns two representatives to congress. Montpelier, centrally located, is the capital. The state prison is at Windsor; and there are insane asylums at Brattleboro and Waterbury, a reform school at Vergennes, and a house of correction at Rutland. Vermont possesses, besides its public schools and academies, three normal schools, the Vermont University and Agricultural College, Middlebury College, Norwich University, and the Methodist Conference Seminary and Female College.

History.—Samuel Champlain, in 1609, was the first white man who looked upon Vermont. The first permanent settlement was made at Bennington in 1761; a year later, one in Newbury. The whole territory now called Vermont was claimed by New Hampshire, and Governor Wentworth, of that state, between 1762 and 1768, conveyed to settlers 138 townships. These went by the name of 'New Hampshire Grants.' New York, however, asserted that the whole territory belonged to her, under a charter given by King Charles II. to the Duke of York; and in 1763 Governor Tryon ordered a sheriff to eject all settlers holding lands under titles from New Hampshire. But the settlers, under the lead of Ethan Allen, Seth Baker, and others, organized themselves into companies, and agreed to protect each other against all efforts to drive them from their lands. These were called 'Green Mountain Boys.' Their opposition to the New York officers was so determined and effective that the latter were compelled to return home without accomplishing their purpose. New York appealed to King George, and obtained a decision supporting its title. But as the settlers had paid for their lands, they refused to give them up on the king's decree. A bloody contest seemed inevitable, but the opening of the revolutionary war engrossed the attention of all parties. The settlers, however, intent on maintaining their rights, met in convention, adopted a constitution, proclaimed their independence, chose representatives to Congress, and asked admission into the Confederacy. New York, by persistent opposition, succeeded for thirteen years in keeping them out. Finally, on payment of $30,000, it yielded, and Vermont was received into the Union, March 4, 1791, as the fourteenth state. Meanwhile the settlers rendered valiant service to the other states during the revolutionary war at Ticonderoga, Crown Point, and Bennington. At the same time, all the diplomacy of Ethan and Ira Allen was brought into requisition to prevent the 'Grants' from being overrun by British troops from Canada, who hoped to retain Vermont a British colony.

In the civil war the state furnished 35,242 soldiers, or one for every ten of its entire population, and one-half of all its able-bodied men. Pop. (1800) 154,465; (1840) 211,948; (1880) 332,286; (1890) 332,428. The state has suffered greatly from emigration: census reports show that one-third of the native-born population live in other states.

Vernal Grass, SWEET (*Anthoxanthum odoratum*), a grass very common in Britain and throughout Europe and the northern parts of the world generally, growing in meadows, woods, and pastures. It is about a foot high, with spiked oblong panicle, the flowers remarkable as having only two stamens. The spikelets are one-flowered; the glumes very unequal; the floret accompanied by two rudimentary florets. It is relished by cattle, and is sown along with other grasses to form permanent pastures. The pleasant smell of newly-mown hay is often chiefly owing to this grass, which is fragrant when drying, and contains Coumarin (q.v.). It yields by distillation an essential oil of an agreeable odour. The straw is of use for the finest kinds of straw-plaiting.

Vernation, in Botany, a term employed to designate the manner in which the leaves are arranged in the leaf-bud. It corresponds with Æstivation (q.v.) in the flower-bud. There are great differences in the vernation of plants, which are characteristic not only of species but of genera, and even of natural orders; the vernation of the same species is always the same. In some plants the leaves are very simply placed together; in others they are most curiously folded, rolled, or plaited, and interlaced with each other, yet so as to separate most readily when the proper time for their expansion comes.

Verne, JULES, was born at Nantes on February 8, 1828. After writing various comedies and

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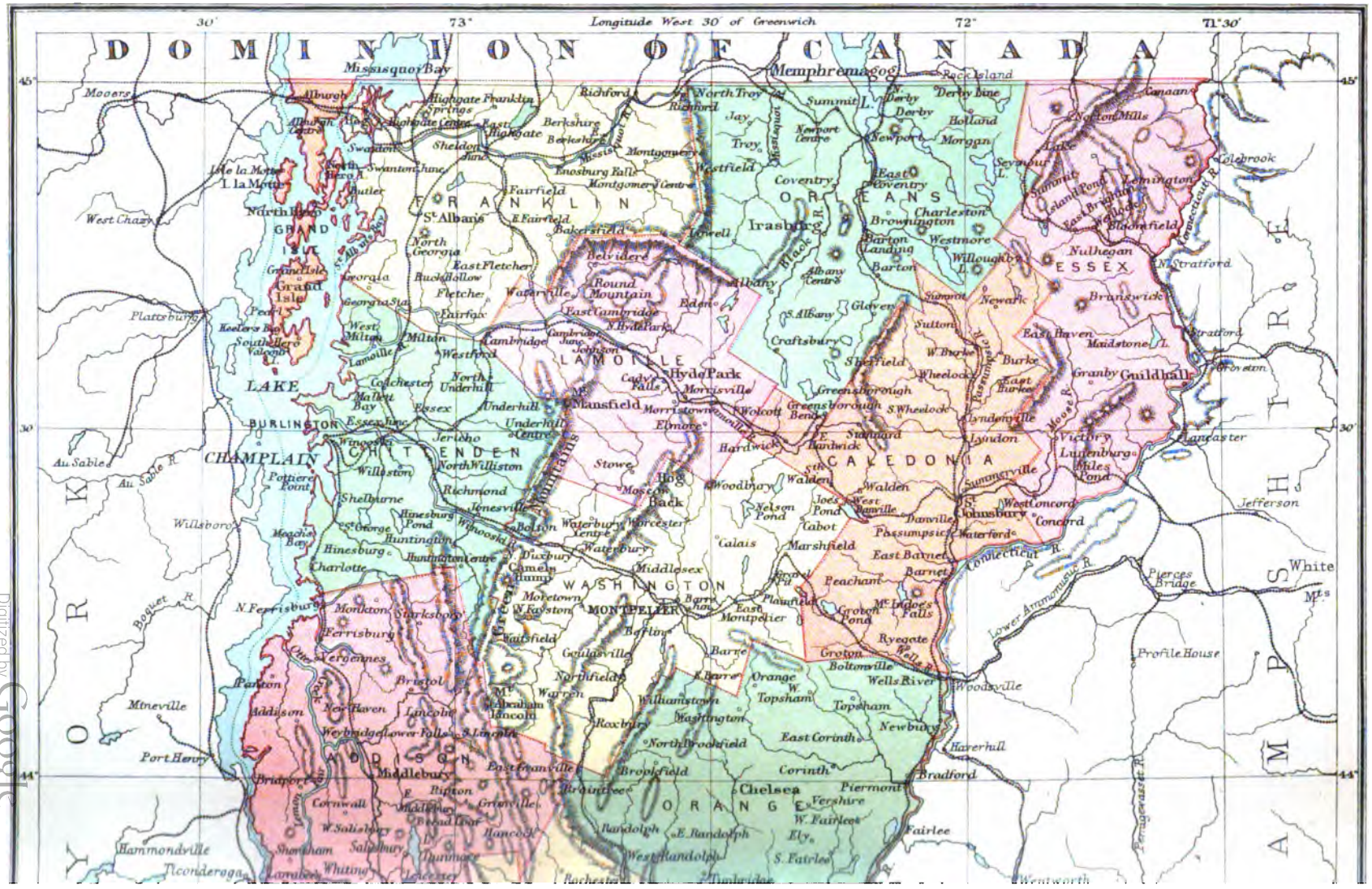

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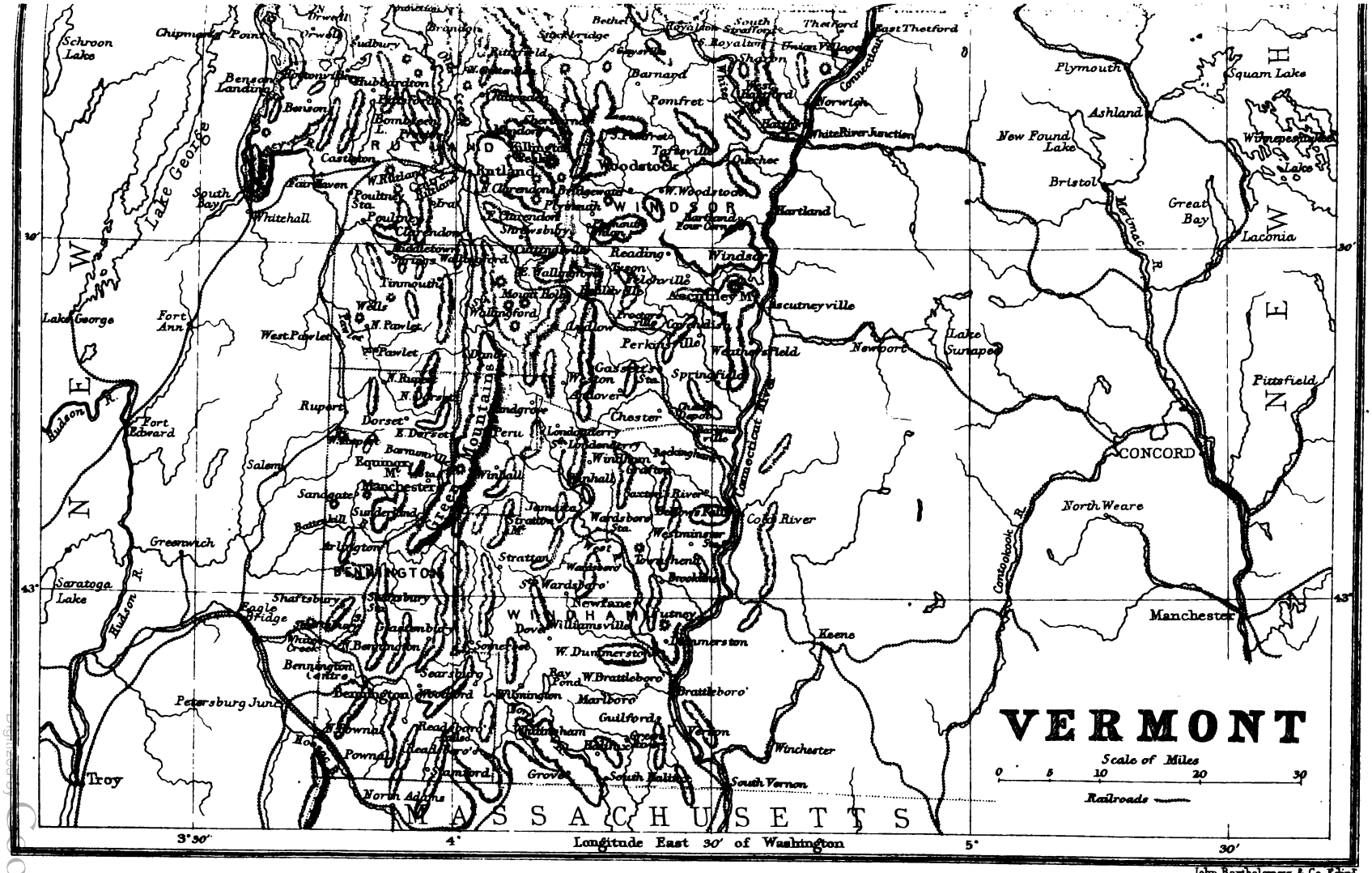
VERMONT
Scale of Miles
0 5 10 20 30
Railroads
MASSACHUSETTS
Longitude East 30' of Washington
3°30'
4°
5°
30'
43°
Lake George
Lake Champlain
Connecticut River
Hudson R.
Contoocook R.
Merrimack R.
Whitehall
Troy
Rutland
Bennington
Brattleboro
Windsor
Woodstock
Springfield
Keene
Manchester
Concord
Lebanon
Hanover
Newport
Claremont
Lake Sunapee
Lake Winnipesaukee
Laconia
Plymouth
Ashland
Bristol
Great Bay
Squam Lake
New Found Lake
Pittsfield
North Weare
Cold River
Petersburg Junc.
Saratoga Lake
Eagle Bridge
Schroon Lake
Benson Landing
South Bay
Fort Ann
Fort Edward
Lake George
West Pawlet
Granville
Whitehall
Castleton
Poultney
Fair Haven
Middletown Springs
Wallingford
Tinmouth
Wells
Pawlet
Dorset
Rupert
Salem
Arlington
Sandgate
Manchester
Sunderland
Shaftsbury
Bennington Centre
Bennington Junction
Woodford
Pownal
North Adams
Stamford
Readsboro'
Searsburg
Halifax
Guilford
Vernon
South Vernon
Winchester
Marlboro
Dummerston
Newfane
Williamsville
Townshend
Brookline
Grafton
Windham
Londonderry
Peru
Landgrove
Weston
Andover
Chester
Perkinsville
Cavendish
Ludlow
Mount Holly
Plymouth
Reading
Cuttingsville
Shrewsbury
Clarendon
Rutland
Proctor
Pittsford
Brandon
Sudbury
Orwell
Chipman's Point
Benson
Hubbardton
Castleton
Fair Haven
Poultney

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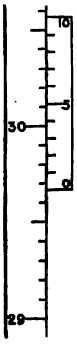
operatic librettos, and turning out a great deal of hackwork, he struck a new vein in fiction whereby he earned a world-wide reputation. He cleverly exaggerated the possibilities of present-day science, and gave ingenious verisimilitude to narratives of wild adventure carried out by means of marvellous inventions. His stories, which have been translated into well-nigh every European tongue, include *Five Weeks in a Balloon*, *Twenty Thousand Leagues under the Sea*, *From the Earth to the Moon*, *Around the Moon*, *Meridiana*, *The Survivors of the Chancellor*, *Martin Paz*, *Michael Strogoff*, *Keraban the Inflexible*, *The Green Ray*, *The Fur Country*, *A Journey to the Centre of the Earth*, *Hector Servadac* (a wonderfully clever account of a voyage on a comet), *The Mysterious Island*, and *Around the World in Eighty Days*. The two last named are his best books—*Around the World* being a little masterpiece of construction and exciting narrative. The characters in these singular tales are the veriest automata. There is not a drop of human blood in all M. Verne's clockwork crowd of explorers, sailors, engineers, reporters, scientists, and puppets with labels innumerable. The reader's interest depends as solely on incident as it does in the *Arabian Nights*. And in M. Verne's earliest stories the interest is wonderfully well sustained. The amusement to be derived from his later books is hardly such as he aimed at creating—as in the case of his Glasgow worthies (in *The Green Ray*), who quaff tankards of 'foaming usquebaugh' and do other deeds equally characteristic of Scotsmen.

Verner's Law. See PHILOLOGY, p. 125.

Vernet, the name of three eminent French painters. CLAUDE JOSEPH VERNET was born at Avignon in 1714, travelled in Italy, and worked for twenty years in Rome, but returned to Paris in 1753 to paint for the king the sixteen chief seaports of France. He died 3d December 1789. See the study by Lagrange (Paris, 1863).—His son, ANTOINE CHARLES HORACE VERNET, popularly known as Carle Vernet, was born at Bordeaux in 1758. He received his education at the Academy of Paris, and, gaining the *grand prix* (1782), studied thereafter in Rome. He enjoyed a high reputation at Paris as a painter of horses, dogs, and large battle-pieces to the glorification of the great Emperor down to his death, 17th November 1836.—EMILE JEAN HORACE VERNET, his son, was born in Paris, June 30, 1789, and had but an irregular education amid the tumults of the Revolution. He soon made himself exceedingly popular by abundant work always brilliant and vigorous, but hardly ever anything more. His best work is marked by the characteristic faults of improvisation; his detail has ever much more of phantasy than nature. But his battle-pieces—Friedland, Wagram, Jena, Fontenoy, Isly—were delightful incense to that mean shadow of a real patriotism, French Chauvinism. He was director of the French school of art at Rome from 1827 till 1835, he travelled in Algiers and Russia, and down till his death at Paris, January 17, 1863, honours were heaped upon him. See Durande, *Joseph, Carle, et Horace Vernet* (Paris, 1865).

Vernier, an auxiliary scale which facilitates the accurate reading of linear or angular scales. It was invented by Pierre Vernier (1580–1637), who spent most of his life in the service of the king of Spain in the Low Countries. Suppose we have a scale of inches graduated to tenths, and that we wish to measure accurately to hundredths. We must make a small scale, the vernier, with *ten* of its subdivisions equal either to *nine* or to *eleven* of the small divisions of the principal scale. It is evident that each division of the vernier is smaller (or greater) than each division of the scale by $\frac{1}{10}$ of that division—i.e. by $\frac{1}{100}$ of an inch. To use the instrument the vernier must be slid along parallel to the scale until its zero line comes opposite the position to be measured. The figure shows the position of the vernier for the reading 29·67. Here the zero of the vernier lies between the graduations 29·6 and 29·7. Running our eye up the scale we see that the seventh graduation on the vernier is exactly opposite a graduation on the scale. Hence the sixth on the vernier must be higher than the next lower graduation on the scale by $\frac{1}{100}$, the fifth by $\frac{2}{100}$, and so on to the zero of the vernier, which will be found accordingly to lie $\frac{7}{100}$ higher than 29·6. Verniers are not always constructed so simply as that just described; and on beginning to work with a graduated instrument the operator must by inspection discover the law of the vernier. For example, in the best forms of barometer the principle scale is graduated to half-tenths, and the vernier is so constructed as to have twenty-five divisions corresponding in total length to twenty-four on the scale. Each vernier division is less than each scale division by $\frac{1}{24}$ of $\frac{1}{20}$ of an inch—i.e. $\frac{1}{480}$ of an inch. The vernier graduations are named in order—0, 2, 4, 6, and so on to 50. Thus, if the vernier zero stands between 29·65 and 29·7, and if the vernier graduation 24 is exactly opposite a scale graduation, the reading is 29·65 + ·024, or 29·674. It may be that 24 lies a very little above a scale graduation, and the next vernier graduation, 26, a little below the next in order. The reading would then be 29·675. It is thus possible to read to thousandths of an inch, although the vernier is graduated so as to give only $\frac{1}{100}$ of an inch. The vernier has long superseded all other methods of accurate subdivision, and is an indispensable equipment of barometers, theodolites, sextants, and all astronomical and surveying instruments. See GRADUATION, and SCALE.



Vernon, a small town of the French department of Eure, on the Seine, 15 miles NW. of Mantes by rail. Pop. 7017.

Vernon, EDWARD, admiral, was born at Westminster in 1684, the son of a Whig statesman, who was secretary of state from 1697 to 1700. He entered the navy in 1701 and parliament in 1722; commanded at the storming of Portobelo (1739) and in the disastrous Cartagena expedition (1741); and died at Nacton, his Suffolk seat, 29th October 1757. See the *Memorial* by W. F. Vernon (1861).

Verona, an ancient city of Italy, capital of a province in the division of Venetia, stands on a plain at the base of the foot-hills of the Alps, 72 miles W. of Venice by railway. It stands on a bend of the Adige, by which it is divided into two unequal parts, connected by five bridges. The aspect of the town and of the landscape around is remarkably fine. Verona is a fortress of the first class, a member of the famous Quadrilateral (q.v.), and has always been considered a place of strength since it was surrounded with walls by the Emperor Gallienus in 265 A.D. After passing into the hands of the Austrians in 1815 it was greatly strengthened; and after 1849 they made every effort to render it impregnable. The walls are now obsolete, the strength of the city depending on a circle of outlying forts. Of its many interesting edifices the chief is the amphitheatre, built in the 2d or 3d century A.D. The building has been fairly well preserved, the interior having, however, been 'restored.' The lesser diameter of the building is 404 feet, that of the arena 146 feet; and the

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edifice is calculated to have contained 22,000 people. Among Roman remains are gateways, part of a theatre, and some mosaics found in 1885. The streets of Verona are wide, especially the Corso; there are four principal squares, of which the Piazza dei Signori contains the palace of the Della Scala (1370) and the superb Palazzo del Consiglio (restored in 1873). The cathedral dates from 1187, and has an altarpiece by Titian; the Romanesque basilica of St Zeno is larger and more interesting, and belongs to the same century; and there are many other churches, some of them containing fine paintings. The palaces are also numerous and fine, a number of them by Sanmichele. The ancient castle of Theodoric is still a barrack; the Castle of the Scalas (1355) is also a barrack and arsenal. The picture-gallery is especially rich in pictures of the Veronese, Paduan, and Venetian schools. The most important masters of the Veronese school were Altichiero (14th century), Vittore Pisano or Pisanello (1380–1455), and Morone (1473–1529). Paul Veronese, though a native, belonged to the Venetian school. Among the glories of the place are the tombs of the Scala family, with their wondrous wrought-iron railing of separate links, dating from 1350 to 1380. There is much trade in corn, oil, and wine, especially transit trade with Germany by the Brenner railway, and manufactures of silk, woollens and cottons, furniture, musical instruments, &c. Pop. 60,768. The oldest inhabitants of Verona were Rhætians, who were conquered by the Celtic Cenomani. It afterwards fell into the hands of the Romans, and under the empire became one of the most flourishing cities in the north of Italy. Constantine took it by assault in 312; Stilicho defeated the Goths here in 402; Attila plundered it in 452; Theodoric the Ostrogoth defeated Odoacer here in 489, made it his residence, and figures much in mediæval legend as Theodoric of Verona (in German Dietrich von Bern). It was long the capital of the Lombards; afterwards it was torn by the struggles of Ghibellines and Guelphs, being the home of Shakespeare's Capulets and Montagues (q.v.). After the death of Ezzelino da Romano, a chief of the Montecchi, the city chose in 1260 Mastino della Scala as podestá, and from that date his family exercised a powerful and brilliant tyranny over the city for 127 years, the most powerful of the Scala princes (in Latin Scaligeri; as having in legend been first to mount a ladder—Lat. *scala*—in a siege) being Can Grande I. (died 1329), the patron and protector of Dante. Mastino II. died in 1351, Can Grande II. in 1359, Can Signorio in 1375. In 1387 the city fell under the power of Milan, in 1405 under that of Venice, and with Venice passed under Austrian domination till 1866. See Perini, *Storia di Verona* (1873–75).

Veronese, PAOLO, the name by which Paolo Caliari (or Cagliari), a great artist of the Venetian school, is usually known, from his having been born at Verona, probably in 1528. A sculptor's son, he studied painting under an uncle, Antonio Badile, a respectable artist, and, after some work in his native city and Mantua, in 1555 settled in Venice, where he rapidly acquired both wealth and reputation. He had for contemporaries both Titian and Tintoretto, and, though fifty years Titian's junior, was held in equal admiration with these famous painters. The church of San Sebastiano, in Venice, contains many of his pictures (both frescoes and easel pictures, from the story of Esther, martyrdoms, &c.) which are reckoned the most important of his earlier period—the period before his visit to Rome (1563), when he first became acquainted with the masterpieces of Raphael and Michelangelo. The influence of the Roman school on his style was marked, new dignity, grace of pose, and ease of movement being added to his rich Venetian colouring; a specific decorative element is also hereafter more conspicuous. He was kept busy with innumerable commissions, some of which he executed elsewhere than at Venice (as at Vicenza and Treviso). He died in Venice, 19th April 1588, and was buried in San Sebastiano. Veronese is remarkable more for the fertility than for the depth or spirituality of his imagination. His design is generally noble, his composition rich, and his execution truthful. In the invention of details, especially, he is inexhaustible, and often overloads his pictures with ornament. One peculiarity of his works is the frequent introduction of splendid architectural backgrounds, which, however, were frequently painted by his brother Benedetto. The most celebrated of his works—many of them very large—is the 'Marriage Feast at Cana of Galilee,' now in the Louvre at Paris; it is 20 feet high, and 30 in length, and contains 120 figures, many of them portraits of contemporaries, and the details much more 16th-century Italian than ancient Jewish. Besides these may be mentioned 'The Calling of St Andrew to the Apostleship,' 'The Feast of Simon,' and (in the National Gallery) the 'Presentation of the Family of Darius to Alexander,' and 'St Helena's Vision of the Invention of the Cross'—the former purchased for 13,000, and the latter for over 3000 guineas. Veronese was the last of the great Venetian painters.

See Symonds, *Renaissance in Italy* (1877); Crowe and Cavalcaselle; and a monograph by Caliari (Rome, 1888).

Veronica. See SPEEDWELL.

Veronica, ST, was, according to the legend, one of the women who met our Lord on His way to Calvary, and offered Him her veil to wipe the sweat from His brow; when, wondrous to tell, the divine features were miraculously imprinted upon the cloth, and remained as a permanent picture of the face of our Lord. This miraculous picture is reported to have been preserved in Rome from about the year 700, and was exhibited in St Peter's on 8th December 1854. Milan and other places, however, dispute with St Peter's the possession of this most sacred relic; and many Catholic writers have supposed that the name 'Veronica' is but founded on an erroneous application of what was meant to designate not the personage, but the picture, which was called *vera icon* (Gr. *eikōn*), 'the true image' (i.e. of Christ). *Berenice*, however, is in the Clementines the name of the daughter of the Canaanitish woman healed by Jesus, with whom also Veronica (perhaps a form of the same name) has been identified. The Bollandist legend does not seem to be older than the 15th century. See Karl Pearson's monograph *Die Fronica* (Strasb. 1887), and *Dublin Review* (1885).

Verrecchio, ANDREA DEL, goldsmith, sculptor, and painter, was born at Florence in 1435 and died at Venice in 1488. First a goldsmith, he became a sculptor almost equally skilled in working marble and bronze. Only one extant picture can be certainly attributed to him, a Baptism of Christ in the Florentine Academy, and in this, according to Vasari, an angel's head was by Leonardo da Vinci. Of his bronze statues the 'David' and the 'Unbelieving Thomas' in Florence, and the great equestrian statue of Bartolommeo Colleoni at Venice are amongst the most notable.

Verres, Roman proprætor in Sicily (73–71), infamous for extortions which desolated the island. The inhabitants committed the care of his prosecution to Cicero, who had been quæstor in Sicily in 75. The orator collected his evidence in fifty days, and so tremendous was its weight that his opponent Hortensius threw up the cause after the first day.

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Verres did not wait for condemnation, but fled before the nine days' hearing of evidence was over. He found shelter at Marseilles, but nemesis reached him in proscription by Antony (43), greedy for his art-treasures.

Verrugas, a streamlet in a rocky ravine amongst the lofty mountains over and through which runs the Central Railway of Peru (see PERU, Vol. VIII. p. 79). Over a rocky ravine stood a bridge of three iron piers (the central one 252 feet high), which, built in 1873, was swept away by a flood in 1889. Its successor, finished in 1891, has but two piers, and the lofty central span is 585 feet long.

Versailles, a city of France, capital of the dept. of Seine-et-Oise, stands on a plain 11 miles SW. of Paris by rail. A city more of pleasure than of industry, long accustomed to find its sustenance in the expenditure of a luxurious court, and subsequently a place of residence for many foreigners, attracted hither by the salubrity of the climate, the fine promenades, and the economy of living, as compared with that in Paris, it has few manufactures and little trade. The town covers a large area in proportion to its population, and is of remarkably regular construction, consisting of long and straight streets, crossing at right angles. It is the see of a bishop, and contains a public library of 50,000 volumes, many palatial edifices, public fountains, spacious squares, and elm-planted avenues. The great attraction of Versailles is its palace, and the history of this structure may be said to be the history of the town. Louis XIII. built a hunting-lodge here, afterwards extended into a château. The site occupied by the palace is known to have been that of the ancient priory of St Julien. Louis XIV. devoted enormous sums to its embellishment, or rather reconstruction, under the care of Mansard (see RENAISSANCE, Vol. VIII. p. 642); and Louis XV. altered the arrangement of the interior. Here was signed in 1783 the peace of Versailles between England and the United States. Under Louis XVI. Versailles continued to be one of the usual residences of the court down to the period of the Revolution, which great event had its beginning here in the meeting of the States-general in May 1789. At this date the population was 100,000; the palace and its park, the perfection of formal landscape gardening, have been the model of many capitals. Louis-Philippe transformed the palace of Louis XIV. into a museum, to contain trophies of the victories of France. The approach to the palace is by the *Place d'Armes* and the *Cour d'Honneur*, in the latter of which are a large equestrian figure of Louis XIV. and other statues. The entire length of the palace is nearly 1400 feet. The collections embrace pictures of events in French history, portraits of French heroes, &c. The most interesting are the pictures by David which illustrate the career of Napoleon, those by Horace Vernet, and some by Ary Scheffer and Delacroix. The gardens, with their broad terraces and long alleys, are imposing, but formal; the fountains are on the grandest scale. From the middle of September 1870 till the conclusion of peace in 1871 Versailles was the centre of all the operations of the Germans. On September 20 King William and the Crown-prince entered the town; and there, on January 18, 1871, the former was proclaimed Emperor of Germany. On January 28 the capitulation of Paris was signed in Versailles; after the peace it was the seat of the National Assembly and government till 1879, and headquarters of the army during the Commune. Pop. (1876) 49,522; (1881) 48,324; (1891) 51,679.

See works by Laborde (1840), Gavard (19 vols. 1837–49), Dussieux (2d ed. 1887), Boeg (1887), and Laurent-Hanin (1885 *et seq.*).

Verse. See METRE, RHYME.

Versecz, a Hungarian town of 22,239 inhabitants, 45 miles S. of Temesvar by rail, with a brisk trade, especially in wine.

Verst, a Russian measure of length, containing 3500 English feet, and so nearly equal to two-thirds of a mile.

Verstegan, RICHARD (died about 1635), author and printer, was the descendant of a family from Guelderland settled in England, was educated at Oxford, but after becoming a Catholic established himself at Antwerp as a printer. He was an accomplished Anglo-Saxon scholar. Of his works the best known are *Theatrum Crudelitatum Hæreticorum* (Antwerp, 1587; often republished), with copperplates showing the hanging, quartering, &c. of the Catholic martyrs by the Protestants; *Odes in Imitation of the Seven Penitential Psalms* (1601); and *A Restitution of Decayed Intelligence in Antiquities* (1605), a work showing much erudition, and containing some quaint and ingenious speculation.

Vertebrata. In popular as well as in more exact classification it has been long recognised that mammals, birds, reptiles, amphibians, and fishes have certain important characteristics in common which distinguish them from molluscs, insects, crustaceans, worms, and other animals of simpler type. Yet it was not until 1797 that the distinctive characteristics were stated with some precision by Lamarck, who drew a firm line between 'backboned,' or vertebrate, and 'backboneless,' or invertebrate, forms. During the 19th century anatomists and embryologists have made the distinctions which Lamarck pointed out yet more precise, and the more important characteristics may be summed up as follows. (1) In vertebrates the central nervous system, viz. the brain and the spinal cord, lies on the dorsal surface of the body, and is tubular in structure. (2) In all young vertebrates there is formed along the dorsal surface of the gut, and therefore of hypoblastic origin, a supporting rod or notochord, which in the simpler forms may persist throughout life, but in higher forms is more or less completely replaced by the backbone—an axis developed from the mesoblastic sheath of the notochord. (3) In almost all young vertebrates several pairs of slits or clefts open from the pharynx to the exterior; in some amphibians, all fishes, and simpler forms they persist throughout life as respiratory organs, and are usually associated with feathery gills; in most amphibians they disappear during adolescence; in reptiles, birds, and mammals they are practically functionless vestigial organs, which in a few cases do not even open. (4) A great part—e.g. the retina—of the vertebrate eye arises as an outgrowth from the brain, whereas the eye of invertebrates develops as a direct insinking of the skin. (5) In vertebrates the heart is formed on the ventral surface, while that of invertebrates is dorsal. (6) Finally, vertebrates agree with annelids and arthropods among the invertebrates in being bilaterally symmetrical segmented animals. The segmentation is shown by the distribution of the nerves and ganglia, by the gill-clefts, by the series of vertebræ, by the muscle-segments and nephridia (kidney-tubes) in embryonic life at least.

But, while our knowledge of these characteristics has become more precise, it is no longer possible to draw a boundary line between vertebrates and invertebrates with a firm hand. It can no longer be said that fishes form the base of the vertebrate series, for hag and lamprey (Cyclostomata), though in many ways more primitive, are certainly vertebrates; the lancelet (Amphioxus), though perhaps degenerate, cannot be excluded from the alliance;

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the tunicates, though almost always degenerate in adult life, are all vertebrates in their youth, and the worm-like Balanoglossus has also certain hardly disputable vertebrate characters. Moreover the influence of evolutionary conceptions has led zoologists to disbelieve in the rigid apartness of any type—a disbelief which is, moreover, strengthened by the discovery of vertebrate affinities among various invertebrates—e.g. annelids, nemerteans, and arthropods. In regard to the precise origin of Vertebrata there are several rival theories, but none of these has as yet found a solid foundation. See the articles SPINAL COLUMN and SKELETON, and those on the several divisions of vertebrates.

Classification of Vertebrata or Chordata.

Mammals.	
Birds	Sauropsida.
Reptiles	
Amphibians	Ichthyopsida.
Fishes	
Cyclostomata.	
Cephalochordata (Amphioxus)	Surviving offshoots of ancestral vertebrates.
Urochordata (Tunicates)	
Hemichordata (Balanoglossus)	

Vertigo (dizziness, giddiness, swimming in the head) 'is that condition in which a person suffers from a sense of failing equilibrium, of falling, or of rotating.' It 'may vary from a mere uncomfortable sense of oscillation, such as one feels after landing from a sea-voyage, to a condition in which the patient is quite unable to maintain his equilibrium, and either falls to the ground or is forced to support himself by clutching some fixed object.' In its most characteristic forms the patient feels either as if he were being turned round or as if surrounding objects were being moved round him. Its direct cause is probably either (1) disturbance of the cerebral circulation or (2) abnormal sensory impressions from the semicircular canals (see EAR) or eyes, from which the chief sensations governing equilibration are derived. A familiar example of (1) is the dizziness often experienced on assuming or rising from a stooping posture; of (2) that following two or three quick turns of the body on its own axis, or rapid movement in a small circle.

(1) In disease vertigo is met with in faintness or loss of blood, in cerebral congestion, epilepsy, and other brain diseases. It is often met with as a symptom of disturbed digestion, probably from reflex effect upon the circulation in the brain. (2) Vertigo connected with ocular disturbance generally depends upon some abnormal condition, either spasm or paralysis of one or more of the external muscles of the eyeball. It is much more commonly met with in diseases of the ear; in the cases grouped under the name of Menière's disease the semicircular canals are themselves the seat of disease; but frequently in disease of the middle ear, and even sometimes in disease of the external ear, vertigo is one of the symptoms complained of. The cause of vertigo, and therefore the treatment to be adopted in any particular case, must be decided by a careful study of the other symptoms with which it is associated.

Vertue, GEORGE, engraver and antiquary, was born in London in 1684, and, after studying under two engravers, in 1709 commenced business for himself. He was generously befriended by Kneller the portrait-painter; and his success in engraving a portrait of Tillotson at once placed him in the very front rank of his profession. In 1711, on the institution of the Academy of Painting, he enrolled himself as a member; but his contributions were few and unimportant. In his own more special department he wrought through life assiduously, confining himself for the most part to reproductions of portraits. Himself, from an early period, devoted to antiquarian research, which he prosecuted in journeys throughout England, he was appointed in 1717 engraver to the Society of Antiquaries. He died on 24th July 1756, and was buried in the cloisters of Westminster Abbey. In addition to his eminence in his art, he was a man of considerable general accomplishment; an adept in drawing and music, and with a competent knowledge of French, Dutch, and Italian. At his death his manuscripts were bought by Horace Walpole, who made free use of them in his *Anecdotes of Painting in England.*

Vertumnus. See POMONA.

Verulam. See ST ALBANS.

Vervick. See WERWICQUE.

Verviers, a manufacturing town of Belgium, most picturesquely situated on the river Vesdre, 15 miles ESE. of Liége by rail. It is of recent growth, and depends almost wholly on its cloth manufactures. Pop. (1881) 41,692; (1891) 50,223.

Vervins, a small town (pop. 2858) in the French department of Aisne, 25 miles NE. of Laon. Here in 1598 an important treaty was concluded between Henry IV. (q.v.) of France and Philip II.

Vesalius, ANDREAS, anatomist, was born at Brussels, 31st December 1514, and studied at Louvain, Cologne, Montpellier, and Paris. He lectured at Basel, became surgeon to the imperial army in the Low Countries, and was professor of Anatomy successively at Padua, Pisa, Bologna, and Basel. In 1544 he became body-surgeon to Charles V., living in Madrid. Condemned by the Inquisition as a sorcerer, he was sent by Philip as penance on a voyage to Palestine. But he died on the way at Zante, 15th October 1564. His *De Corporis Humani Fabrica* (1543) marks an epoch in anatomy. See monographs by Burggraeve (Ghent, 1841), Mersman (Bruges, 1845), Weynants (Louvain, 1846), and Roth (Basel, 1886).

Vesicants. See BLISTERS.

Vesica Piscis. See NIMBUS, and SYMBOL.

Vesoul, capital of the French department of Haute-Saône, 40 miles W. of Belfort by rail. It is surrounded by vineyards, has some cloth-weaving, trade in grain, &c., and a pop. (1891) of 9642.

Vespasian. TITUS FLAVIUS VESPASIANUS, the tenth of the twelve Cæsars, Roman emperor 70–79 A.D., was born of comparatively humble family near Reate, 9 A.D. He served as tribune in Thrace, as quæstor in Crete and Cyrene, in the reign of Claudius commanded a legion in Germany and in Britain, where he subdued the Isle of Wight, was consul in 51, and next proconsul of Africa, and in 67 was sent by Nero to reduce the Jews to subjection. An able soldier and honourable man, he is admitted by Tacitus even to have been 'but for his avarice equal to the generals of old days.' He was popular with his men, and when the struggle began between Otho and Vitellius he was proclaimed emperor by the legions in Alexandria, and soon after throughout all the East. Leaving the war in Judæa to his son Titus to complete, he reached Rome in 70, and soon restored the government and the public finances to order, besides showing an admirable example to a corrupt age by the simplicity and frugality of his life. After the fall of Jerusalem and his joint triumph with Titus, the temple of Janus was closed, and for nine years the wearied world had rest. Vespasian died in the summer of 79. His alleged avarice was most likely a mere wise economy, for we find him liberal enough to his subjects in distress, and to men of letters like Quintilian, as well as spending lavishly upon public works like the Colosseum (begun under him). He had a quick eye for men of virtue and capacity like Julius Agricola, whom he sent to Britain in 78.

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He was tolerant and good-natured, plain and blunt in manners, with a rich vein of humour which never left him to the last: 'Methinks I am becoming a god' he whispered to the bystanders around his bed.

See the *Lives* of Suetonius and the *Histories* of Tacitus; but especially Dean Merivale's *History of the Romans under the Empire*.

Vespers. See BREVIARY.

Vespucci, AMERIGO, a naval astronomer, from whom America accidentally received its name, was born at Florence, March 9, 1451, and was at the head of a large Florentine firm in Seville in 1496. He fitted out Columbus' third fleet, and in 1499 himself sailed for the New World with Ojeda, and explored the coast of Venezuela (q.v.). In 1501–4 he was in the service of Emanuel of Portugal, and in 1503 discovered All-Saints' Bay, on the coast of Brazil, afterwards running south as far as Cape Frio. In 1505 he was naturalised in Spain, and from 1508 till his death, February 22, 1512, he was pilot-major of the kingdom. The accident which fastened his name on two continents may be traced to an inaccurate account of his travels published at St Dié in Lorraine in 1507, in which he is represented to have reached the mainland in 1497—which would have been before either Cabot or Columbus—and in which the suggestion is made that he should give his name to the world he had discovered.

Vesta, a great Roman divinity, goddess of the hearth, identified with the Greek Hestia. The latter was one of the twelve great divinities of the Greeks, daughter of Cronos and Rhea. A virgin goddess, she watched over domestic life, and had her shrine in the inner part of every house, and in the *prytaneum* of every town considered as an aggregation of families. Here, as at a private hearth, the sacred fire ever burned in her honour, and from hence it was carried by colonists to their new home. Similarly the Roman Vesta, whose worship was introduced by Numa from Lavinium, whither Æneas bore the *Penates* and the sacred fire from Troy, had her round temple in the centre of the city, where she was worshipped under the symbol of the eternal fire, watched over by the Vestal virgins. This fire was renewed on the 1st of March, and if it went out a great national disaster might be looked for. It could only be rekindled by the primitive method of friction, or, as Plutarch says, by the use of the burning-glass. The duty of the six (at first four) Vestal virgins was to keep this sacred fire burning, every day to bring water from the sacred spring of Egeria for the purification and sprinkling of the temple, to make a sacrifice of salt cakes, to offer daily prayers for the well-being of the state, and to pour on the altar of sacred fire libations of wine and oil. They also preserved the *Palladium* (q.v.) and the six other mystic symbols of the welfare of the city. They were chosen by lot out of twenty selected by the *Pontifex*, when not more than ten years of age, and took a vow for thirty years, after which time they were free to return to the world if they chose. In the first ten years the Vestal virgin learned her duties, during the second she practised them, and during the third she taught them to the young vestals. A breach of the vow of chastity was punished by burial alive in the Campus Sceleratus. Their privileges were correspondingly great; they paid no taxes, owed obedience to the Pontifex Maximus alone, could will their own property, and drive in carriages through the streets, were attended by a lictor when they went abroad, and had places of honour at all public games. They gave evidence without oath, enjoyed the privilege of burial in the Forum, and had the keeping of many documents of state. If they met a criminal by chance on the way to execution he was free. Their house, the *Atrium Vestæ*, close to the temple, was large and magnificent, and they had public slaves appointed to serve them. It was excavated only in 1883–84 (Middleton's *Anc. Rome in 1888*). Their dress was entirely white; the chief characteristic feature being the *infula*, a coronet-shaped head-band with ribbons (*vittæ*) hanging from it, and covered at the time of sacrifice by a white veil (*suffibulum*). This was a white woollen hood, with a purple border, folded over the head and fastened below the throat with a *fibula*. The *Vestalia* or chief day of festival of Vesta was kept on July 9, after which the temple was closed for five days for cleaning.

See Preuner, *Hestia-Vesta* (Tüb. 1864); Maes, *Vesta e Vestali* (Rome, 1883); and J. G. Frazer in the *Journal of Philology* (vol. xiv.).

Vestments, SACRED. The use by the priesthood of a distinctive costume in public worship formed a part not only of the Jewish, but of almost all the ancient religions. Generally speaking, in the Christian church the sacred vestments represent the original costume of Rome and the East in the first centuries, retained unaltered by the clergy, whereas in the everyday world the costume varied in fashion, in material, in colour from year to year. There seems little room for doubting that from a very early time Christian ministers employed some distinctive dress in public worship; and Catholic writers even find traces in the beginning of the 5th century of the practice of blessing the vestments which were destined for the public services of the church. The vestments used in the celebration of mass by priests of the Roman Catholic Church are the Amice (q.v., originally worn over the head); the Alb (q.v.); the girdle, a linen cord tied round the waist, and confining the folds of the alb; the maniple, a narrow strip of embroidered silk, worn pendent from the arm; the Stole (q.v.); and the Chasuble (q.v.). The three last named are always of the same material and colour; but this colour, which appears primitively to have been in all cases white, now, and for many centuries, varies according to seasons and festivals, five different colours being employed in the cycle of ecclesiastical services—viz. white, red, green, violet, and black. Cloth of gold, however, may be substituted for any of these, except the last. Bishops, in celebrating, wear, besides the vestments of priests, two inner vestments, the dalmatic and tunic (those of the deacon and sub-deacon respectively), as also embroidered gloves and shoes, or buskins, together with the distinctive episcopal ornaments—the pectoral cross, ring, mitre, and pastoral staff, or, if archbishops, the crozier. Archbishops celebrating mass also wear the Pallium (q.v.). Bishops, when they celebrate pontifically, take their vestments from the altar, whereas priests put them on in the sacristy; but this is a late distinction. In other public services priests and bishops wear the Cope (q.v.), with a pendent cape or hood. In the ministration of the other sacraments, and also in administering communion privately, priests wear the Surplice (q.v.) with the stole, or it may even be the stole alone. In the Greek Church the *stoicharion*, *zoné*, *epitrachelion*, *epimanikia* (a square piece of cloth, stiffened, worn pendent from the girdle, and perhaps originally a napkin), and ample *phelonion* correspond respectively with the alb, girdle, stole, maniple, and chasuble. Greek bishops wear the *omophorion*, which corresponds with the later pallium, and also a pectoral cross, and carry a short pastoral staff; but they wear no ring, and, except by the patriarch of Alexandria, the mitre is not worn in the sanctuary.

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The natural effect of the religious changes of the 16th century was to put aside the costume at the same time and on the same grounds with the ceremonies of the existing worship. This was done, however, by the different churches of the Reformers in very various degrees. The Calvinistic worship may be said to have dispensed with vestments altogether. The Lutherans generally retained with the cassock the alb, and in some countries the chasuble. In the Swedish Church full vestments are retained. In the English Church a variety of practice has existed. See SURPLICE. As to the rest of the costume, the first Prayer-book retained the Roman vestments with little change; and as the vestments and ornaments of 1549 were again enjoined in 1559, a so-called ritualistic movement in the English Church has since 1851 reintroduced in some places almost every detail of the Roman costume in the communion and other services, a revival which has in many instances been vigorously resisted. See PRAYER-BOOK, p. 380; and Marriott's *Vestiarium Christianum* (1868).

Vestris, MADAME, actress, was the granddaughter of Bartolozzi the engraver, and was born in London, 7th March 1797. Accomplished in music, French, and Italian, Lucia Elizabeth Bartolozzi married at sixteen Armand Vestris, ballet-dancer, member of an originally Florentine family that gave to France a series of distinguished cooks, actors, and ballet-dancers. Three years later she separated from her worthless husband and went on the stage in Paris (1815), attaining fair success. In 1820 she appeared at Drury Lane, soon became famous in *The Haunted Tower*, was even more popular as Phœbe in *Paul Pry*, and in light comedy and burlesque was uniformly successful. She was lessee of the Olympic when in 1838 she married Charles James Mathews, and she afterwards undertook the management of Covent Garden and the Lyceum. She retired in 1854, and died at Gore Lodge, Fulham, 8th August 1856.

Vestry (Fr. *vestiaire*, Lat. *vestiarium*, 'robing-room' or 'room where vestments are kept;' hence a meeting held in a vestry), in English parishes a meeting of all the ratepayers, assembled on three days' notice, to elect parish-officers—churchwardens, overseers, a vestry-clerk, and, if need be, a collector of rates—to assess church-rates, and to manage the property of the parish. The vestry has also the right to adopt the Free Libraries Act, the Lighting and Watching Act; but many of its powers have been taken away by poor-laws and laws as to public health. The incumbent is chairman, if present; the voting is by show of hands, but if a poll is demanded the ratepayer has a number of votes corresponding to the amount of rates paid. Select vestries, a certain number of the chief inhabitants, are appointed by justices of the peace in accordance with Hobhouse's Act (1831) or local usage. See PARISH, CHURCH-RATES, CHURCHWARDENS, POOR-LAWS.

Vesuvian, or IDOCRASE, a mineral composed essentially of silica (37 to 39 per cent.), alumina (13 to 16 per cent.), and lime (33 to 37 per cent.), and containing a small percentage of water and usually some oxide of iron. It occurs both massive and crystallised—the general form of the crystals being that of a rectangular prism terminated by faces of the protopyramid and basal planes. The edges of the prisms are often replaced. The hardness = 6·5, and specific gravity = 3·34 to 3·45. The mineral has a vitreous and sometimes resinous lustre, and varies in colour from brown to green; but is occasionally yellow, azure blue, or black. It was first found in dolomitic blocks ejected from Vesuvius and Somma, but occurs in granular limestone, serpentine, gneiss, and other rocks in regions where crystalline schists abound. It is often associated with garnet and pyrotoxene. It is not highly valued as an ornamental stone. The green-coloured varieties are known as *Volcanic Chrysolite*, and the brown as *Volcanic Hyacinth*.

Vesuvius, the most striking object seen from the Bay of Naples, a mountain of dense tufa (pumice-stone and ashes), is supposed to have been heaved up from the submarine level where it was formed. Besides the shells which indicate its sea-origin, it contains erratic blocks of limestone from the higher Apennine-offshoot, Monte Somma, which, in an irregular semicircle, surrounds it on the north and east. The latter—the Mons Summanus of antiquity, once crowned by a temple of Jupiter—was the seat of volcanic activity long before Vesuvius, which first (63 A.D.) became convulsed by earthquakes, repeated at intervals till 79, in which year occurred its earliest known eruption (see POMPEII). This was followed by others, of which the more memorable are that in 472, when its ashes alighted in Constantinople; in 512, when they were wafted to Tripoli; in 1036; and in 1500; after which ensued a period of inaction, broken in December 1631 by a destructive outbreak which denuded the mountain of the forest-growth with which it had become clothed. The 18th century witnessed many of its eruptions, the most remarkable being that of 1793, when a lava-stream 12 to 40 feet thick swept over Torre del Greco and penetrated the sea to a distance of 380 feet, by which time its volume was 1204 feet wide and 15 feet high. This stream was so liquid that to leave the crater and enter the sea—a journey of 4 miles—it took only six hours. Another memorable outbreak was that of 1822, when the so-called 'smoke' from the crater rose to a height of 10,000 feet, emitting flashes of lightning, raining torrents of hot water, and flooding the villages of S. Sebastiano and Massa. In 1855 occurred a terrible eruption, in which the summit of the cone discharged a lava-stream which ravaged the fertile and highly-cultivated region below. On December 8, 1861, Torre del Greco suffered severely from another visitation, surpassed in turn by that of 1871–72, when the sudden emission of lava from a crater of 1855 killed twenty spectators on the spot. S. Sebastiano and Massa were again greatly damaged, the cone threw up fragments of rock to a height of 4000 feet, and the explosions were so loud that the whole country-side fled panic-stricken to Naples. The activity of the volcano, accompanied by distinct shocks of earthquake, lasted for a week. From the observations of many years the following characteristics of the volcanic activity of Vesuvius have been summarised by Professor Palmieri. (1) The filling up of the crater portends an imminent eruption, and its full discharge is followed by a period of repose. (2) The narrowing of the mouth of the crater by accumulated debris impedes the flow of the lava, and this impediment leads to the outburst of lateral openings which from their greater proximity to the source of heat emit the lava in a more liquid condition, whereby its flow becomes that of a continuous stream. (3) When the internal channel is blocked by solid debris, the effort of the elastic vapour to clear it is supposed to cause the earthquakes by which the greater eruptions are preceded and accompanied. (4) What is called 'smoke' from the crater is simply steam more or less blackened with incinerated dust. When this dust is in excess it accelerates the fall of the steam, which, having become water by condensation, descends like a mud-torrent, flooding the ground. This was a notable feature of the visitation in which Pompeii perished. (5) During an eruption what appears as flame shooting out of the crater is really the reflection of the molten

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lava within the crater upon the steam and upon the ashes suspended in the steam accumulated above it. (6) The rapid condensing of vapour into water, and the conversion of this into steam, generates electricity, which explains the lightning-effects visible on the edges of the clouds overhanging the crater. Vesuvius is reckoned by geologists the most instructive object-lesson on volcanoes in general, and the university of Naples, by an admirable assortment of specimens of its structure, has greatly facilitated its study. Professor Sacchi numbers forty species of minerals found in it, of which augite, hornblende, mica, sodalite, breislakite, magnetic iron, and leucite are the most abundant. The fertility of its slopes, since Martial's famous epigram on the destruction of Pompeii, has passed into a proverb, its chief product being the wine called Lacrima Christi, red and white, the latter superior in bouquet. Its observatory (1844) has acquired a European reputation from the meteorologist Melloni, and still more from his successor, Professor Palmieri, who directed it with equal sagacity, skill, and daring from 1854 till his death in 1882. The so-called railway, but rather cable-tram, from the base to near the summit, was opened in 1880.

See the late Prof. Phillips' *Description of Vesuvius*, the papers of Dr Johnston-Lavis, and J. S. Lobley, *Mount Vesuvius: Historical and Geological Account* (1889).

Veszprim, a Hungarian city, 25 miles SW. of Stuhlwerssenburg by rail, and on a hill 5 miles NW. of Lake Balaton. Pop. 12,584.

Vetch (*Vicia*), a genus of plants of the natural order Leguminosæ, sub-order Papilionaceæ, having a tuft of hairs on the style beneath the stigma, nine stamens united, and one free. To this genus the *Bean* (q.v.) is referred by the authors of the *Genera Plantarum*, an arrangement not generally adopted by botanists. The species, however, are mostly climbing plants, annuals, with pinnate leaves ending in tendrils, and with no terminal leaflet. A number of species are natives of Britain. The Common Vetch (*V. sativa*), sometimes called by agriculturists Tare, frequent in cultivated ground in Britain and throughout Europe, and itself much cultivated as green food for cattle, has rather large purple, blue, or red flowers in pairs, axillary and almost sessile. In cultivation it varies considerably both in size and other particulars, as in the breadth of the leaflets, the number of them in a leaf, &c. Oats are sometimes sown along with it, to afford it a little support, and thus prevent its rotting in wet weather. *V. Cracca* and *V. sepium* are very common British species, the former with many-flowered stalks, bearing beautiful bluish-purple flowers, being one of the most beautiful climbing plants, and a chief ornament of trees, hedges, and bushy places in the latter part of summer. These and other species, natives of Britain or of different parts of Europe and the north of Asia, have been either occasionally cultivated as food for cattle or recommended for cultivation, and generally agree with the Common Vetch both in their qualities and in the mode of cultivation which they require. *V. biennis* and *V. narbonnensis* are amongst those chiefly cultivated in some parts of Europe. The species of vetch are very numerous, chiefly in the temperate parts of the northern hemisphere. For the Bitter Vetch, see OROBUS.

Common Vetch (*Vicia sativa*): *a*, seed-pod.

Veterinary Medicine. The ancients—more particularly Homer and Xenophon—wrote about horses and their management; Virgil's *Georgics* show close observation of the domestic animals and their ailments; and the Latin term *veterinarius* is as old at least as the 1st century A.D. Hippocrates, the father of medicine, wrote a treatise on the veterinary art; but its true founder was Vegetius, who wrote *De Arte Veterinaria*, 300 A.D. This work became the oracle of succeeding ages. He was sufficiently liberal-minded to give due credit to Columella and other writers who had preceded him. For many centuries after Vegetius but few writings are known to have appeared, and of these but few extracts now remain, collated by order of Constantine Porphyrogenitus. To a somewhat later date may belong the first application of iron shoes to horses' feet, and the maker of the shoes was entrusted with the medical care of the horse; hence the term *farrier*, 'a worker in iron,' still sometimes given to the veterinarian.

In the 16th century the necessity for a higher cultivation of the veterinary art appeared evident, and Francis I. ordered Constantine's collection to be translated from the Greek into Latin by Ruelli, a physician. From Latin it was soon translated into Italian, French, and German, and became dispersed over Europe; nearly at the same time the works of Vegetius appeared in several languages, and from this period the art made gradual progress. Gessner compiled from Aristotle, Pliny, Columella, Vegetius, and others; soon after Laurentius Ruffius wrote some celebrated works in Latin; and later on appeared the *Natural History of the Ruminantia* and the *Phenomena of Rumination* by Emiliano. During the 17th century the art continued to advance, and numerous treatises were written upon it, the most notable being Cæsar Fiarchi's work on horsemanship, in which is introduced the most rational mode of horseshoeing then practised—he condemned the use of calkings. Carlo Ruini (Bologna, 1598) published the *Infermità del Cavallo, e suoi Remedii*, from which Snape and Gibson in England, and most of the French authors, have copied their anatomical plates. In 1654 the *Grand Mareschal François*, said to be composed by several authors, appeared, and in the latter end of the century Solleysel published an elaborate work. Solleysel, riding-master to the king of France, opposed many abuses, exposed the folly of burning the lampas—a cruelty practised even to this day—reprobated bleeding from the palate in fever, &c. He was extensively copied.

But the first attempt to elevate the art into a science occurred in 1761, when France set the example of establishing the first veterinary college under royal patronage at Lyons, the first professor being Bourgelat, who wrote numerous anatomical and medical works bearing on the infant science. Shortly afterwards (1766) a second school was established at Alfort near Paris, to which Bourgelat was transferred. Both of these colleges are still flourishing, and establishments of a similar kind were organised in the capitals of almost every European country, including London. Contemporary with Bourgelat flourished the elder La Fosse, who made numerous discoveries and improvements, usually communicated in the form

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of memoirs to the Academy of Science in Paris. In 1754 these memoirs were published in one volume, which was quickly translated into other languages. His son proved a worthy successor to the illustrious father, in 1766 publishing his *Guide de Maréchal*, and in 1772 his greatest work, the *Cour d'Hippiatrique;* it contains sixty-five anatomical plates coloured after nature, with concise descriptions in letterpress. He afterwards published his *Dictionnaire d'Hippiatrique* in 4 vols. After the death of Bourgelat and the two La Fosses no great progress was made until after the Revolution, when the names of Hartman, Chabert, Huzard, and others stand prominently forward.

Reverting to the history of the art in Britain, we find that Thomas Blundeville (fl. 1561) was one of our earliest authors. He was succeeded by Mascal, Martin Clifford, and Burdon, and at this time Gervase Markham wrote his well-known but absurd *Treatise on Farriery*. In the time of Charles II. Snape's *Anatomical Treatise on the Horse* appeared. In the reign of George I. Solleysel's treatise was translated by Sir William Hope. About the middle of the 18th century appeared the works of Gibson, Bracken, Bartlet, Osmer, Taplin, and others. The majority of these writers were entirely ignorant of the *nature* of disease; in fact they were men of *recipes* and infallible cures, having but little knowledge of anatomy, physiology, or the allied sciences, although many of them were members of the medical profession; consequently glanders, farcy, blindness, pole-evil, &c. were rampant. The diseases of cattle were but little studied; hence the loss of animal life was very great. The importance of a more extended knowledge of the art as a science now began to be felt in England, and the Odiham Agricultural Society in 1791 formed the Veterinary College of London, with M. St Bel as professor. St Bel, a Frenchman who had studied under Bourgelat, died in 1793.

The professorship was now accepted by Coleman, a young surgeon, a friend of Sir Astley Cooper, Abernethy, Cline, Babington, and other eminent men. He paid great attention to sanitation and the prevention of diseases. Against the prevailing opinion he recommended fresh air in the treatment of lung diseases, and his ideas on ventilation were soon justified by marked decreases in such diseases as glanders and periodic ophthalmia. Coleman was assisted by a practical veterinarian named Moorcroft, who, however, withdrew and became eminent in India. Great interest was taken in the college and its work by John Hunter, Cooper, and others. Coleman was succeeded by Sewell, who recommended the frog-seton—a useless and barbarous practice—in navicular disease and excision of the nerve in chronic foot lameness. Delabere Blain, Percival, and Youatt were good anatomists, but, like their immediate predecessors and contemporaries, they advocated the heroic method of treatment. In fact the complicated but harmless recipes of past authors were thrown aside, and bleeding, physicking, and blistering were fully brought into operation. Sewell was succeeded by Spooner, who was followed by Simonds. After Sewell the heads have been Simonds, Spooner, Robertson, and Brown. Commencing with one professor in 1791, the college now possesses a staff of about a dozen professors and demonstrators, and, from a possibility of obtaining a diploma in a few months, it is now necessary that every student shall attend three scholastic years and pass first an educational—or provide recognised certificates—and three professional examinations. These conditions also apply to the Scottish colleges, and the students from all the schools are examined by one board of examiners, who are appointed for five years by the Royal College of Veterinary Surgeons.

The Edinburgh Veterinary College was instituted by Professor Dick, born in the White Horse Close, Canongate, and the son of John Dick, blacksmith and farrier. He attended lectures on anatomy and medicine at the university of his native city, and towards the end of 1817 he joined the London Veterinary College under Coleman. In 1819 he commenced to lecture in the Freemasons' Hall, Niddry Street, in connection with Mr Scott; but this proving a failure, Dick commenced an independent course in an unfurnished shop in Nicolson Street, one student only being the regular attendant. In 1823 Dick's efforts were patronised and to some extent supported by the Highland and Agricultural Society of Scotland, the lectures being delivered twice a week in the Calton Convening Rooms, and the attendance of students rapidly increasing. Professor Dick died in 1866, leaving his college in trust to the lord provost and magistrates, who in 1867 appointed the present writer to the principalship. He, however, in 1873 founded the New Veterinary College. In 1861 M'Call founded the Glasgow Veterinary College.

In 1844 the members of the profession holding the diplomas or certificates of the schools only obtained a charter from Her Majesty constituting them a body corporate with power to elect twenty-four members of council, who elect their own president and vice-presidents, and appoint examiners. This council now possesses further powers to regulate the curriculum of the teaching colleges, the subjects of examination, &c.

In the later half of the 19th century veterinary colleges have been founded in the United States, in the principal British colonies, and very recently in India. The first college established in Canada is the Ontario Veterinary College at Toronto; and in 1866 another college was instituted in Montreal, and is now the Faculty of Comparative Medicine and Veterinary Science of the M'Gill University. In Australia colleges have lately been instituted, and in India several schools are now in working order, presided over by army veterinary surgeons. The American Veterinary College at New York was incorporated and organised in 1875. Many of the American universities have created faculties of veterinary medicine, the best known of these being that of Harvard; others are those of Minnesota, Cornell, and Ithaca.

See George Fleming's *Veterinary Obstetrics*, *Operative Surgery*, *Animal Plagues*, and several other works, besides his edition of Chauveau and Arloing's *Comparative Anatomy of the Domesticated Animals* (1873); the present writer's *Veterinary Medicine* (10th ed. 1892) and *Veterinary Surgery* (10th ed. 1892); Finlay Dun's *Veterinary Medicines* (1873–78); Robertson's *Equine Medicines;* Smith's *Veterinary Hygiene* and *Veterinary Physiology*, &c. There are four periodicals devoted to the subject in Britain. See also, amongst articles in this work, the following:

Anthrax.	Dog.	Pig.
Black Water.	Farcy.	Pleuro-pneumonia.
Bots.	Fluke.	Ringbones.
Braxy.	Founder.	Spavin.
Cattle.	Germ.	Splint.
Cattle-plague.	Glanders.	Strangles.
Constipation.	Horse.	Ticks.
Consumption.	Horseshoeing.	Tubercle.
Corns.	Mange.	Warranty.
Distemper.	Navicular Disease.	Weed.

Vetiver, the dried roots of the cuscus grass, an Indian Andropogon (see LEMON-GRASS, GRASS-OIL), which has a very agreeable and persistent odour, something like sandalwood. Baskets, fans, and mats are made of it.

Veto (Lat., 'I forbid'), in Politics, the power which one branch of the government of a country may have to negative the resolutions of another branch. In the United Kingdom the power of the crown in the act of legislation is confined to a veto.

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The crown cannot of itself make any alterations in the existing law, but may refuse to sanction alterations suggested and consented to by the two houses of parliament. The royal veto is reserved for extreme emergencies; the last instance in which it was exercised was in 1707, when Queen Anne refused her assent to a bill relating to the militia in Scotland. The House of Lords may reject (and so for a time veto) bills passed by the Commons. In bills of supply the power of the House of Lords amounts merely to a veto, as does that of the House of Commons in bills affecting the peerage. The question as to a British veto on Irish legislation was one of the difficulties in the scheme of Home Rule for Ireland. In the United States of America the president has a qualified right to veto all laws passed by congress; but after that veto has been exercised the bill which he has rejected may become law by being passed by two-thirds of each house of congress. The same rule applies in most of the states, a two-thirds vote in both branches of the legislature passing a bill over the governor's veto. In others the proportion is three-fifths, and in several a simple majority suffices. The president's power of veto was in the earliest days of the republic very sparingly used, but is now resorted to with comparative frequency; while, as an extreme instance, in the state of New York, with a demoralised legislature, no less than 236 bills were vetoed by the governor in one session. The Swiss *referendum* includes the power of veto (see SWITZERLAND, p. 22). For the Polish *liberum veto*, see POLAND, Vol. VIII. p. 271. In revolutionary France in 1795 a Council of Ancients was created, with a power to veto the resolutions of the legislative body. For the Veto Act in the Scottish Church, see SCOTLAND, Vol. IX. p. 245, and FREE CHURCH. The veto is sometimes a name given to total prohibition in temperance legislation; see LIQUOR LAWS, TEMPERANCE.

Veuillot, LOUIS, publicist, born in 1813 at Boynes (Loiret), chose the profession of journalism, and filled several engagements on the provincial press. He visited Rome in 1838, returned to Paris a zealous adherent of the papacy, and, as editor of the *Univers*, soon signalised himself as an aggressive and uncompromising champion of the church. In 1842 he accompanied Marshal Bugeaud to Africa as his secretary, and on his return was made Chief-secretary to the Ministry of the Interior. He again edited the *Univers* in 1848; but his attacks on Napoleon III. led to the suppression of his paper from 1860 till 1867. During the Vatican Council he was a vehement supporter of Ultramontanism. Veuillot, besides polemical pieces, wrote novels, poems, books of travel; in 1857–76 he issued in 18 vols. *Mélanges Religieux, Historiques, Littéraires.* He died 7th April 1883.

Vevay, or VEVEY (Ger. *Vivis*), a Swiss town in the canton of Vaud, a favourite health-resort, remarkable for the beauty of its situation on the north shore of the Lake of Geneva, 11 miles E. of Lausanne by rail. It stands at the mouth of the gorge of the Veveyse. From the elevations about the town the fine view to the east commands the valley of the Rhone, backed by the magnificent rampart of the Alps of Valais. In the church of St Martin (date 1498) Ludlow, one of Charles I.'s judges, and Broughton, who read to him his sentence of death, are buried. There is some trade in milk, cheese, and wine; and Vevay cigars are largely made and exported. Pop. 8144.

Vexilla Regis. See HYMN, Vol. VI. p. 46.

Vézelay, a decaying town in the French dept. of Yonne, 5 miles SE. of Auxerre. Its ancient and curious abbey church was restored by Viollet-le-Duc in 1868. Hither Becket retired in 1168; here St Bernard preached the Crusade in 1145; and on the plain below Richard Cœur de Lion and Philip Augustus joined their forces in 1190 for the third crusade. Beza was a native. Pop. 612.

Viaduct. See BRIDGE.

Via-Mala, a remarkable gorge in the Swiss canton of Grisons, on the course of the Farther Rhine (see RHINE). The roadway (1823) is carried for nearly 2 miles partly in half-open galleries, partly in a tunnel; the rock-walls on either hand rising to 1600 feet, and sometimes but a few feet apart. The road crosses the river three times by bridges, and is about 160 feet above the river.

Via Media. See NEWMAN.

Vianna, a seaport of Portugal, at the Lima's mouth, 45 miles N. of Oporto by rail. Pop. 8816.

Viardot. See GARCIA.

Viareggio, an Italian town on a beautiful site on the Mediterranean coast, 15 miles NW. of Pisa by rail. The once malarious swamps have been drained, and great pine-woods shelter what is now a favourite health-resort. Pop. 10,190.

Viaticum (Lat., 'provision for a journey'), Holy Communion administered to persons in danger of death. It may be received without fasting (as is required in all other cases) from the midnight previous; and it may be given frequently during the same sickness.

Viatka. See VYATKA.

Viaud, LOUIS-MARIE-JULIEN, a charming, but hardly a great writer, who, under his pen-name of Pierre Loti, quickly reached the heart of France, and climbed into a chair at the Academy as early as 1891. Born in a Huguenot home at Rochefort, 14th January 1850, he entered the navy at an early age, and was thus enabled to reap in his voyages round the world that harvest of exotic impressions which was yet to give him a literary stock-in-trade of a quite individual character. *Lieutenant-de-vaisseau* by 1881, he was a year in disgrace for a too truthful series of letters in *Figaro* on the conduct of the French soldiers at Hué in 1883. His first work, *Aziyadé* (1879), a series of pictures of life on the Bosporus, was weak and spoiled by affectation; the second, *Le Mariage de Loti* (1880), carried the imagination captive with all the charm of the coral seas. To Tahiti and the story of Rarahu followed Senegal and the story of Fatou-gaze in *Le Roman d'un Spahi* (1881); next with *Mon Frère Yves* (1883) Brittany and the seas of Southern Europe; and again in his masterpiece, *Pêcheur d'Islande* (1886), Brittany and the seas of the frozen North. To the standard of these two the later works have not attained: *Propos d'Exil* (1887); *Madame Chrysanthème* (1887); *Japonneries d'Automne* (1889); *Le Roman d'un Enfant* (1890), *Le Livre de la Pitie et de la Mort* (1891; Eng. trans. by T. P. O'Connor, 1892), and *Fantôme d'Orient* (1892). Still *Le Roman d'un Enfant* is a work of wonderful subtlety and charm, which for insight into the secrets of child-nature, for vivid truthful rendering of the impressions and experiences of childhood—its questionings and reveries, its strange joys and indefinable terrors—has no equal in literature. The simplicity yet intensity of his sensuous impressions, the pervading emotional sympathy with all nature, the tenderness and elemental melancholy in the mists of Brittany, suggest, but do not explain, the secret of the charm of Pierre Loti. But for depth of thought, broad views of human life, any real humour, we must look elsewhere.

Viborg, one of the oldest cities in Denmark, and capital of a district of Jutland, stands on a small lake, 28 miles W. of Randers by rail. Its 12th-century cathedral was rebuilt in 1726. Pop. 7653. There is also a Finnish Viborg.

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Vibrio, a name given with much laxity to various kinds of more or less screw-shaped Bacteria (q.v.); also to small nematoid worms, such as cause ear-cockles in wheat.

Viburnum, a genus of plants of the natural order Caprifoliaceæ, having a five-toothed calyx, a five-lobed, wheel-shaped, bell-shaped, or tubular corolla, five stamens, three sessile stigmas, and a one-seeded berry. The species are shrubs with simple leaves, natives chiefly of the northern parts of the world. *V. opulus* is the Guelder Rose (q.v.), or Snowball Tree, and *V. tinus* is the Laurustinus (q.v.), both well-known ornamental shrubs. *V. lantana*, sometimes called the Wayfaring Tree, is a native of the warmer temperate parts of Europe and Asia, not unfrequent in England, and often planted as an ornamental shrub. It is a large shrub or low tree, with large elliptic serrated leaves, downy, with star-like hairs on the under side. The young shoots are very downy. The flowers are small and white, in large dense cymes; the berries purplish black, mealy, and mucilaginous, with a peculiar sweetish taste. They are useful in diarrhœa and catarrh, and are used in Switzerland in the manufacture of ink. Bird-lime is made from the bark of the roots in the south of Europe, but is inferior to that made from the bark of the holly. The inner bark is very acrid, and was formerly used as a vesicant. The wood is white and hard, and is prized by turners. Tubes for tobacco-pipes are made of the young shoots. Two North American species, *V. edule* and *V. oxycoccus*, nearly allied to the Guelder Rose, produce berries of an agreeable acid taste, which are used like cranberries. The word *viburna*, from which the name is derived, was used by the ancients to denote any plant the branches of which were pliable and suitable for tying; some of the species are adapted by the toughness and pliability of their branches for that purpose.

Vicar (Lat., 'delegate'), in England, a parson of a parish where the tithes are impropriate (see IMPROPRIATION). In ecclesiastical usage the title is given to those who hold authority as the delegates or substitutes of others. A *vicar-apostolic* (formerly one to whom the pope delegated some remote portion of his jurisdiction) is now usually a titular bishop appointed to a country where either no sees have been formed or the episcopal succession has been broken. *Vicars-forane* are ecclesiastics to whom a bishop gives a limited jurisdiction in a town or district of his diocese—in effect, rural deans. *Vicars-general* in the Roman Catholic Church perform the work of archdeacons. They must be clerks, not laymen, but need not be in holy orders. *Vicars-choral* are assistants, cleric or lay, of the canons and prebendaries in the public services and music; they form a distinct corporation in English cathedrals of the old foundation, in twelve Irish cathedrals, and in St David's.

Vice-chancellor. See CHANCERY, CHANCELLOR.

Vice-consul, a subordinate officer, to whom consular functions are delegated in some particular part of a district already under the supervision of a consul. A British vice-consul is selected by the consul under whom he is to act, and his name is transmitted for approval to the Secretary of State for Foreign Affairs. The vice-consul acts under the general supervision of the consul, corresponding with him in ordinary cases, but in some special cases with the Foreign Office. A consul is not at liberty to dismiss a vice-consul acting within his district without the sanction of the Foreign Secretary. See CONSUL (MERCANTILE).

Vicente. See GIL VICENTE.

Vicenza, capital of an Italian province at the confluence of the rivers Bacchiglione and Retrone, 42 miles W. of Venice by rail. It is surrounded by a moat, and walls half in ruins, and contains many palaces and churches. The Piazza dei Signori, a remarkably fine square, contains a lofty and slender campanile, 270 feet high. Palladio was a native; and Vicenza owes to him many of its finest buildings, as the Palazzo della Ragione, the Olympic Theatre, and the prefect's palace, a rich and fanciful edifice. The Duomo, built in the 13th century, is Gothic; the nave of it is 60 feet wide; and in the chapels are interesting pictures. Manufactures of silk, linen, earthenware, paper, and velvet are carried on. The surrounding country, studded with mansion-houses, and rich in vineyards, is exceedingly beautiful. Pop. 27,694. Vicenza (anc. *Vicentia*, or *Vicetia*) continued to be a municipal town of some consideration till it was laid waste by Attila, 452 A.D. It revived again under the Lombards, and became for a time, in the middle ages, an independent republic.—The province, which runs up to the Alpine ridges dividing Italy from the Austrian Trentino in Tyrol, contains on the north the *Sette Comuni*, seven village communes, which, formerly German, for a time formed a kind of republic under Venetian protection. In two of these villages German is still the principal language.

Vice-president. See PRESIDENT.

Viceroy, a title popularly given to any officer who is delegated by a sovereign to exercise regal authority in his name—as the Lord-lieutenant of Ireland, the Governor-general of India, popularly but not officially called viceroys. See also KHEDIVE.

Vich, or VIQUE, a Spanish city, 40 miles N. of Barcelona by rail, with a modernised cathedral and some manufactures. Pop. (1887) 11,640.

Vichy, a small town in the heart of France, dept. Allier, stands on the Allier, in a fine valley surrounded by hills clad with vines and fruit-trees, 30 miles SSE. of Moulins by rail. Vichy is the most frequented bathing resort in France. The springs which rise at the foot of the volcanic mountains of Auvergne (q.v.) are of the alkaline class, somewhat acidulous, and the most efficacious of the kind that are known. They vary in temperature from 54° to 113° F., are used both for drinking and bathing, and are resorted to in cases of indigestion, chronic catarrh, gout, and especially liver disorders (see MINERAL WATERS). Millions of bottles of Vichy water are exported annually. The virtues of the *aquæ calidæ* of this place were known in Roman times, as is testified by the remains of marble baths and coins that have been dug up; but their modern repute arose only in the 19th century, being greatly promoted by the visits of Napoleon III. Now this town of (1891) 10,525 inhabitants is visited by from 20,000 to 30,000 persons annually. See Cormack, *Mineral Waters of Vichy: Excursions in the Environs* (1887).

Vicious Intromission. See INTROMISSION.

Vicksburg, the largest city of Mississippi, stands on a high, uneven bluff above the Mississippi River, 235 miles by rail NNW. of New Orleans. Cotton is shipped and railroad cars and iron are manufactured. The place was strongly fortified by the Confederates during the civil war, and repulsed several attacks; but after a siege by land and water from May 18, 1864, it was surrendered to Grant on 4th July, with nearly 30,000 men. Pop. (1890) 13,373.

Vico, GIOVANNI BATTISTA, jurist, philosopher, and critic, was born, the son of a bookseller, at Naples, 23d June 1668, studied law at the university, but devoted himself to literature, history,

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and philosophy, and, after serving as tutor to the nephews of the Bishop of Ischia for nine years, became in 1697 the professor of Rhetoric at Naples. To this poorly paid appointment was added in 1735 the post of historiographer to the Bourbon king, Charles III. of Naples. He struggled most of his life with poverty and latterly with ill-health, and died 20th January 1744. His great work is his *Scienza Nuova*, of which the first edition appeared in 1725, but the work was completely recast in the second edition of 1730. A third edition appeared in 1744 after its author's death. The work is a treatise of the history of civilisation and of the evolution of law, and in virtue of it Vico is regarded as the founder of the philosophy of history. Though profoundly influenced by Bacon and Grotius, he differs widely from either of them, deriving law from conscience and conscience from the inspiration of God; God's providence is the basis of history. He also published orations, minor works, and a discourse on universal law. As a critic he anticipated Wolf in holding that Homer was not one but many poets.

There are editions of Vico's works by Ferrari (1835–37) and Pomodoro (1858–69), and a full selection by Michelet (Paris, 1835). See the monograph by Cantoni (Turin, 1867) and that by Professor Flint (1884).

Victor, CLAUDE PERRIN, Duc de Belluno, and marshal of France, was born at La Marche (Vosges), 7th December 1764, and at seventeen enlisted in a regiment of artillery, and served eight years as a common soldier. He re-enlisted in 1792, and rose rapidly; for his conduct at the siege of Toulon in 1793 he was made general of brigade. He served with distinction in the Italian campaigns, especially covering himself with glory at Montebello and Marengo. Napoleon gave him the marshal's baton on the bloody field of Friedland (1807), and later the title of Duke of Belluno. From 1808 till 1812 he commanded the first corps d'armée in Spain, and lost the battles of Talavera and Barrosa. He commanded the ninth corps d'armée in the fatal Russian campaign, and covered the crossing of the Berezina. He fought at Dresden and Leipzig, lost the emperor's favour by neglecting to occupy the bridge of Montereau-sur-Yonne, and was severely wounded at Craonne. Louis XVIII. gave him the command of the second division, and to his shame the presidency of the military commission appointed to try such of his old companions in arms as had deserted to Napoleon during the 'Hundred Days.' He was minister of War from 1821 to 1823, and died at Paris, March 1, 1841. *Mémoires Inédits* was published in 1846.

Victor Amadeus. See SAVOY.

Victor Emmanuel II., the first king of a united Italy, was the son of Charles Albert (q.v.) of Sardinia, and was born March 14, 1820. (For Victor Emmanuel I., king of Sardinia, see SAVOY.) He early showed military ardour, and in command of the brigade of Savoy in the campaign of 1848–49 displayed great gallantry at Goito and Novara. On the evening of the latter battle his father, unwilling to bow to the onerous conditions offered by Radetzky, abdicated in favour of Victor Emmanuel, who, being the husband of the Austrian Archduchess Adelaide, and uncommitted to the views of the Italian Ultra-democrats, might hope to obtain more favourable terms from the victor. Victor Emmanuel thus ascended the throne of Sardinia, March 23, 1849. The events of his reign, his policy and that of his ministers, Azeglio, Cavour, and others, issuing in the reconstitution of the kingdom of Italy under the Sardinian dynasty, is already treated at ITALY, Vol. VI. pp. 251, 252. The king had the wisdom to leave statecraft mainly in the hands of the able men who advised him, reigned as a strictly constitutional monarch, and retained to the last the simple tastes of a hardy (but not ascetic) mountaineer and huntsman. The 'Re Galantuomo,' as his people fondly called him, died January 9, 1878, and was buried in the Pantheon. He was succeeded by his son Humbert. His daughter Clotilde was, for the sake of the French alliance, but rather against the king's will, married to Prince Napoleon (see BONAPARTE).

Victoria, Queen of the United Kingdom of Great Britain and Ireland and Empress of India, only child of Edward, Duke of Kent (fourth son of George III.), was born at Kensington Palace, 24th May 1819. Her mother, Victoria Maria Louisa (1786–1861), was the daughter of Francis, Duke of Saxe-Coburg, and sister of Leopold, king of the Belgians. Her first husband, the Prince of Leiningen, died in 1814; and in 1818 she married the Duke of Kent. The duke died in 1820, leaving his widow in charge of an infant daughter only eight months old, who had been baptised with the names of Alexandrina Victoria. The Duchess of Kent fulfilled the important duties which devolved upon her with more than maternal solicitude, and with admirable care and prudence; and by-and-by the Duchess of Northumberland was associated with her in the education of the young princess. The princess' father having belonged to the Whigs, her political education was naturally derived from the members of that party; and to Viscount Melbourne (q.v.) belongs the credit of having thoroughly instructed her in the principles of the British constitution. She ascended the throne of the United Kingdom on the death of her uncle, William IV. (q.v.), 20th June 1837; her uncle, the Duke of Cumberland, became king of Hanover, in virtue of the law which excluded females from that throne, and so the long connection between the crowns of England and Hanover was terminated. Victoria was proclaimed 21st June 1837, and crowned at Westminster, 28th June 1838. She found on her accession Viscount Melbourne at the head of the government; and on a change of administration (1839) she refused to change, in accordance with precedent, the ladies of the bedchamber, the result being that Peel resigned and Melbourne's administration was prolonged till 1841. The young queen was married at St James's Palace (10th February 1840) to Prince Albert (q.v.), Prince of Saxe-Coburg and Gotha, and second son of the then reigning duke.

The chief events of this long reign, whose jubilee was celebrated in 1887, may be traced in the articles on England, Great Britain, Ireland, the several colonies, India, and the successive premiers (see below), on the Corn Laws, Post-office, Reform, Jews, Army, Education, Volunteers, Crimean War, Abyssinia, Afghanistan, Zulus, Egypt. In 1876 'Empress of India' was added to the royal titles of the Queen. The death of the Prince-Consort in 1861 led his widow to seclude herself for several years from public life, but, though she never afterwards took so prominent a part in public life, she never neglected any of her essential duties as queen. Other severe trials were the deaths of the Princess Alice (of Hesse), of the Duke of Albany, and of the Duke of Clarence, her grandson. No former monarch has so thoroughly comprehended the great truth, that the powers of the crown are held in trust for the people, and are the means and not the end of government. This enlightened policy has entitled her to the glorious distinction of having been the most constitutional monarch Britain has ever seen. Not less important and beneficial has been the example set by her Majesty and the Prince-Consort in the practice of every domestic virtue.

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Their stainless lives, their unobtrusive piety, and their careful education of the royal children have borne rich fruit in the stability of the throne. The progress made by the nation in the various elements of civilisation and in material prosperity has been unparalleled, and perhaps during no reign has there been a greater measure of political contentment.

Her Majesty has had four sons and five daughters: the Princess Royal, Victoria, born 1840, married in 1858 to Frederick-William, afterwards Emperor of Germany (see Vol. IV. p. 807); Albert Edward (q.v.), Prince of Wales, born in 1841, and married in 1863 to Alexandra, daughter of the king of Denmark; Alice (q.v.), born in 1843, married in 1862 to Prince Frederick-William of Hesse, died in 1878; Alfred, born 1844, created Duke of Edinburgh 1866, married in 1874 to Marie, daughter of the Emperor of Russia; Helena, born 1846, married in 1866 to Prince Christian of Denmark; Louise, born 1848, married in 1871 to the Marquis of Lorne; Arthur, born 1850, created Duke of Connaught 1874, married in 1879 to Princess Louise Marguerite of Prussia; Leopold, born 1853, created Duke of Albany in 1881, married to Princess Helena of Waldeck in 1882, died 1884; Princess Beatrice, born 1857, married in 1885 to Prince Henry of Battenberg.

The administrators of the reign have been:

1835.	Lord Melbourne.	1866.	Earl of Derby.
1841.	Sir Robert Peel.	1868.	Mr Disraeli.
1846.	Lord John Russell.	1868.	Mr Gladstone.
1852.	Earl of Derby.	1874.	Earl of Beaconsfield.
1852.	Earl of Aberdeen.	1880.	Mr Gladstone
1855.	Lord Palmerston.	1885.	Marquis of Salisbury.
1858.	Earl of Derby.	1886.	Mr Gladstone.
1859.	Lord Palmerston.	1886.	Marquis of Salisbury.
1865.	Earl Russell.	1892.	Mr Gladstone.

See *Early Days of the Prince-Consort* (1867, prepared under the Queen's direction by General Grey); *Leaves from the Journal of our Life in the Highlands* (1869, with the assistance of Sir Arthur Helps); *More Leaves* (1884); *The Life of the Prince-Consort* (5 vols. 1873–80, prepared under the Queen's direction by Sir Theodore Martin). Also books cited at ENGLAND, especially J. M'Carthy's *History of our Own Times* (4 vols. 1879–80), and J. Humphry Ward's *Reign of Victoria* (2 vols. 1887); with lives of the Queen by Mrs Greenwood (1883), Dr Macaulay (1887), G. Barnett Smith (1886), R. Wilson (2 vols. 1888), and J. C. Jeaffreson (2 vols. 1893).

Victoria, the smallest colony on the mainland of Australia, and with the exception of Queensland the youngest, was at the date of the census in April 1891 the most populous, and has the greatest railway mileage, but in revenue, commerce, and production it is slightly exceeded by New South Wales, of which it originally formed portion. Cape Everard, a point on the south-eastern coast-line, was the first land sighted by Captain Cook in 1770; the harbour of Port Phillip was discovered in 1801, and an unsuccessful attempt to form a settlement on its shores was made by Lieutenant-colonel Collins in 1804. But it was not till 1835 that the country around the harbour which gave its name to the whole district was colonised by Batman and Fawkner, and the neighbourhood of Portland Bay by Edward and Francis Henty, all of whom had crossed Bass Straits from Tasmania. The natural grasses were found to be unusually well suited for the growth of fine wool; large areas of land were taken up by sheep-farmers from the neighbouring colonies and Great Britain, and the seaport towns of Melbourne, Geelong, and Portland were founded. From 1836 till 1851 Port Phillip was administered by the government of Sydney, but in the latter year the district was constituted into the colony of Victoria, with a separate executive and legislature. Its boundaries, which have not been altered since they were originally determined upon, are, on the N. and NE., the Murray River from the point at which it enters South Australia in 141° E. long. to its source; on the W., the colony of South Australia; on the S., the ocean; and on the E., a line drawn from Cape Howe to the source of the Murray. Victoria occupies the south-east of Australia, and has an extreme length from east to west of 420 miles, while its greatest breadth is only 250, and its least only 150; its coast-line is 600 miles, and its area 87,884 sq. m. or 56,245,760 acres. Gold was discovered in 1851, and attracted a large number of immigrants; the first railway was opened in 1854; responsible government was introduced in 1857; in 1862 additional facilities were given for the acquisition of land for agricultural purposes; and in 1865 a protective policy was initiated with the object of stimulating local manufactures.

The geographical position of Victoria and the mountainous nature of a large portion of its area have made its climate generally cooler than that of any other colony on the mainland, with the exception of the mountains and high tablelands of New South Wales. A chain of varying height, the Dividing Range, traverses the greater portion of the colony from east to west at a distance of from 60 to 80 miles from the coast; the eastern portion, termed locally the Australian Alps, divides the watershed of the Murray from Gippsland, and has many peaks with an elevation of from 6000 to 6500 feet. Farther west the height of this mountain-range is much less—although there are isolated summits, such as Macedon, 3324 feet high. In some places, as in the neighbourhood of Ballarat, it dwindles into elevated plains of little more than 2000 feet above the level of the sea, surmounted by occasional hills 500 or 600 feet higher. Farther west the range is better defined, and is known locally as the Pyrenees and Grampians, the highest peak, Mount William, having an altitude of 3824 feet. A few miles beyond this lofty eminence the mountains cease altogether, and are succeeded by extensive plains; in addition to this main range there are many isolated mountains and hills scattered all over the colony.

Most of the rivers rise in this Dividing Range; those on the north find their way into the Murray, which has a total length, including bends, of 1300 miles, 980 of which form the northern boundary of the colony. The principal streams flowing north (going from east to west) are the Mitta Mitta, 175 miles long; Ovens, 140; Goulburn, 345; Loddon, 225; Avoca, 163; and Wimmera, 228; the last mentioned losing itself in Lake Hindmarsh. The southern streams are the Snowy, 300 miles long (180 of them in New South Wales), which flows into the ocean a few miles west of Cape Howe; the Latrobe, 135, falling into the Gippsland lakes; the Yarra, 150, into Port Phillip; the Hopkins, 155; and the Glenelg, 281, into the Southern Ocean. Many of these rivers are in the summer season mere chains of waterholes, and only the Murray and Yarra are navigable, although others, such as the Goulbourn and the Snowy, might easily be made so. The principal lakes are Victoria (45 sq. m.), King (24), Reeve (6), and Wellington (54), in Gippsland, all navigable and communicating with the ocean, Corangamite (90; salt), in the Western District, and Hindmarsh (47; brackish) and Tyrrell (66; salt), in the Wimmera or North-western District.

The principal ports and harbours are Port Phillip, area 800 sq. m.; Western Port; Portland Bay, near the South Australian border; Port Fairy and Warrnambool, between Portland Bay and Cape Otway; and Port Albert in Gippsland. The principal headlands, going from west to east, are Wilson Promontory, in 39° S., the most southerly headland in Australia; Cape Patterson; Cape Schanck; Cape Otway; Cape Nelson; and Cape Bridgewater. The only islands of any importance are Phillip and French Islands in Western Port.

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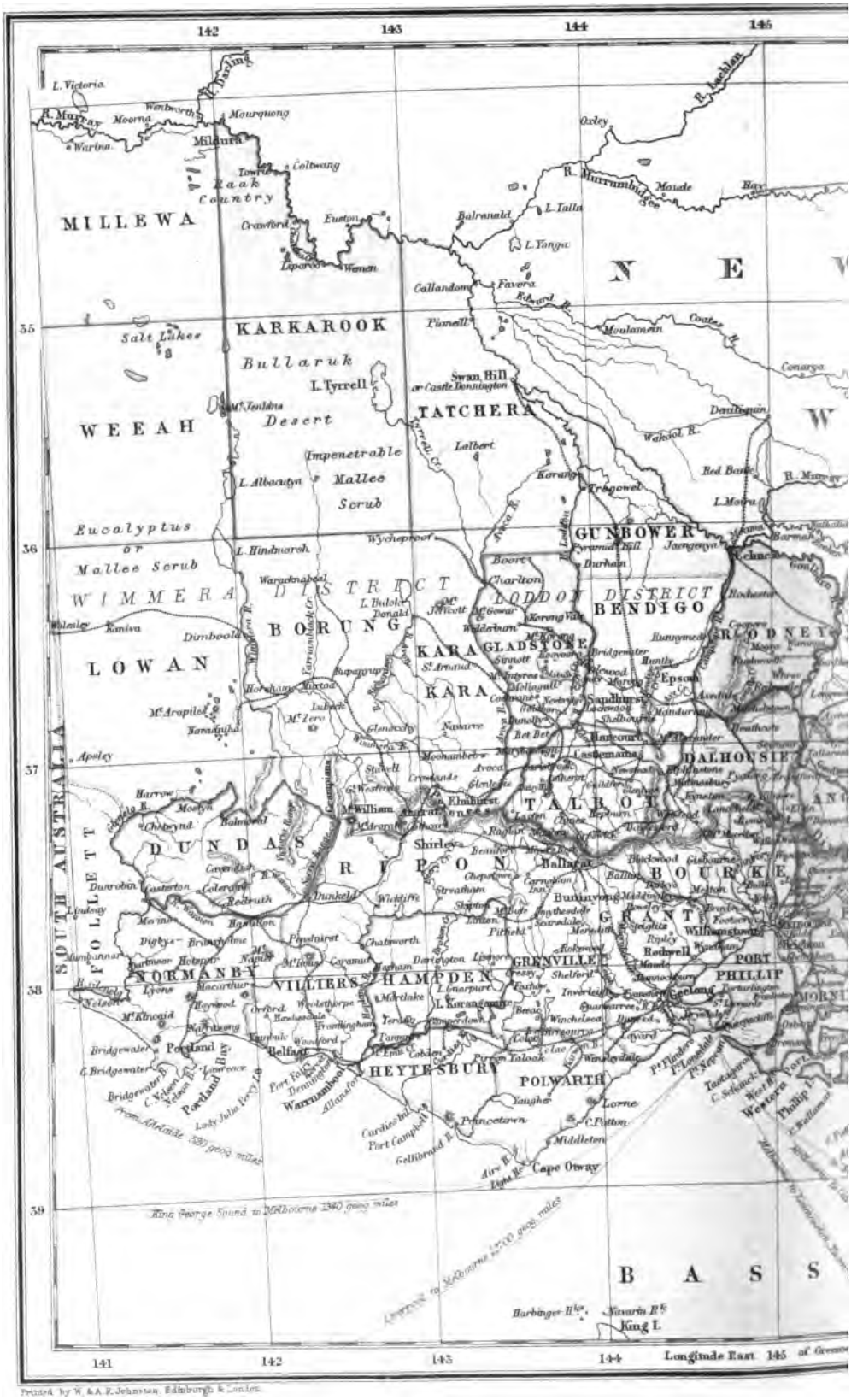

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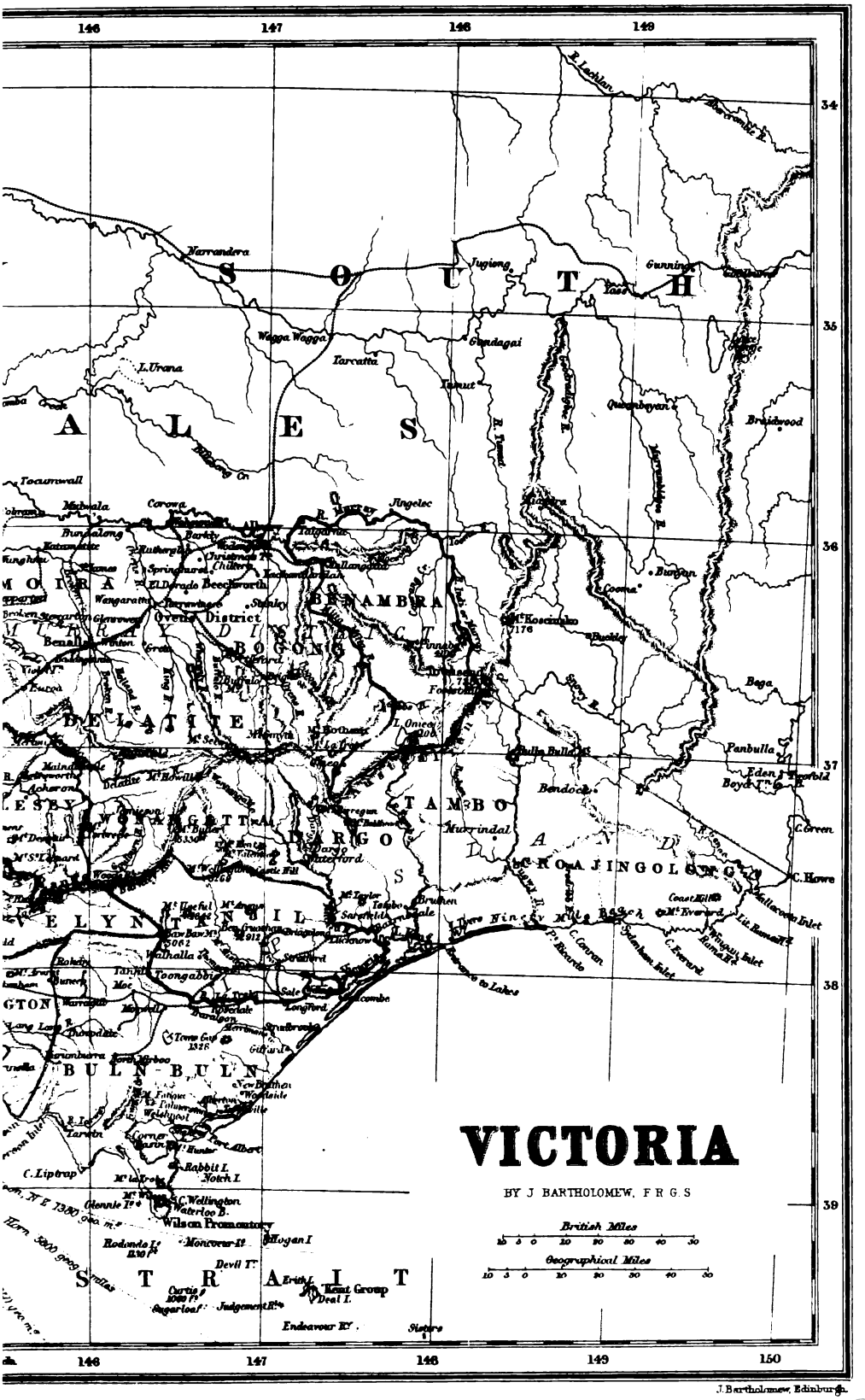
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VICTORIA
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Geographical Miles
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Cooma
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Gundagai
Tumut
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Narrandera
Yarrawonga
Corowa
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Chiltern
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Wangaratta
Benalla
Yea
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Broadford
Whittlesea
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Ringwood
Dandenong
Frankston
Mornington
Cranbourne
Pakenham
Warragul
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Moe
Morwell
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Bairnsdale
Orbost
Cann R.
Snowy R.
Genoa R.
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Kent Group
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Sisters
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C. Wellington
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Port Albert
Yarram
Toongabbie
Walhalla
Woodside
Tarwin
Foster
Meeniyan
Leongatha
Korumburra
Wonthaggi
Inverloch
Phillip I.
Western Port
Port Phillip
Geelong
Queenscliff
Portarlington
Ballarat
Creswick
Daylesford
Castlemaine
Kyneton
Romsey
Gisborne
Macedon
Kilmore
Seymour
Yea
Alexandra
Marysville

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The climate in the mountains is generally agreeable, and the rainfall sufficient. Originally the east of the colony, including Gippsland, was covered with forests, composed of lofty trees, some attaining a height of 300 to 400 feet, and many beautiful shrubs, of which the tree-fern was the most noteworthy. The remaining portion of the colony has the usual Australian characteristics, except that the country south of the Dividing Range, and a few miles to its north, suffers less from drought than districts farther removed from the influence of the ocean breezes, such as are to be found in New South Wales and South Australia. The country is covered during the spring and early summer with brilliant verdure, turned as the summer advances into a natural hay, which, however, in ordinary seasons affords excellent food for stock. The greater portion of Victoria was in its natural state an open forest, but in the western district there were large plains, and a portion of the extreme north-west is covered with a dense scrub of dwarf eucalyptus (mallee), which detracts from its value. Of late years it has been discovered that this mallee-covered land when cleared is well adapted for wheat. In the neighbourhood of certain volcanic hills in the western district the soil is generally extremely rich. At Melbourne the mean return for twenty-six years gives a maximum temperature of 105°, a minimum of 30°, a mean of 57° 3′, and an average annual rainfall of 25·26 inches. This latter is rather greater than at London or Paris, while the temperature corresponds with that of Bordeaux, Madrid, and Marseilles. North of the Dividing Range the temperature is rather higher and the rainfall rather less. Gippsland, in the south-east, contains many richly-grassed plains, and the forests when cleared are fitted for root-crops; the valleys of the north-east are fertile, and the hills are frequently full of mineral wealth. The northern and north-western districts contain rich natural pastures, and large areas available for the growth of wheat and vines. The central, southern, and south-western districts are suitable for pasture, root-crops, and grain. Most of the gold-fields are in the central districts. The flora and fauna of Victoria are identical with those of the southern districts of New South Wales, except that in the animal kingdom the platypus and lyre-bird are more plentiful, and that in the vegetable the tree-fern is more frequently met with, while the cabbage-tree palm and the cedar are practically unknown.

Geology.—Victoria seems to be formed of a great mass of Palæozoic rock, through which protrude large areas of granite and trap, and upon which repose, near the coast, belts of Mesozoic and Tertiary strata and volcanic products. The younger members of the Primary or Palæozoic series are by far the most widely distributed, and are in all respects the most prominent and important formations. With their associated granitic and plutonic or igneous and volcanic rocks, they occupy nearly nine-tenths of the surface of the country. Devonian sandstone, slates, and limestones occur in Gippsland; Secondary rocks are found in the Cape Otway district and in the country east of Western Port; the extinct volcanoes in the western and central district are remarkable and apparently recent; several are to be found south-west of the Dividing Range. Many of the plains are formed by overflows of basalt.

Productions.—Gold was first worked at Clunes in 1857, and shortly afterwards at Ballarat, Forest Creek, and Bendigo. Originally the workings, which now cover 1,500,000 acres, were shallow and alluvial, but most of the gold is now obtained from quartz reefs, some of which are followed to great depths, the deepest being 2500 feet. The total yield of gold up to December 31, 1891, was 58,434,427 oz., valued at £232,199,504, which is more than half the produce of all Australasia. Copper, silver, tin, coal, and antimony have been found in considerable quantities, and exported to the value of £1,200,000. Brown coal is abundant, and it is believed that its existence will be made commercially valuable.

Agriculture and Live-stock.—Of the whole area of the colony 22,461,084 acres belong to private individuals, while of the residue about 16,000,000 are let by the crown for grazing, and 11,500,000 are covered with mallee scrub. Large tracts have been irrigated either by the state or by private individuals. In 1890–91 there were 436,459 horses, 1,782,978 cattle, 12,736,143 sheep, 282,457 pigs, in addition to large numbers of goats, poultry, &c. The number of cultivated holdings for 1890–91 was 36,013, and the extent of land under crop 2,652,768 acres. Of these 1,145,163 were under wheat, 221,048 under oats; 87,751, barley; 53,818, potatoes; 413,052, hay; and 731,906, other tillage, including a large area under English grasses. The yield was 12,751,295 bushels of wheat, or 10·81 bushels to the acre; 4,919,325 of oats; 1,571,799, barley; 204,155 tons of potatoes; and 567,779 tons of hay. The area under vines was 20,686 acres, which produced 1,578,590 gallons of wine, 5285 gallons of brandy, and 59,428 cwt. of table grapes. The area under hops was 829 acres, and the produce 5711 cwt.; under tobacco, 955 acres, produce 4123 cwt. All the English fruits grow in Victoria, with the addition of those of southern Europe, together with the loquat and the passion fruit; but it is not hot enough for the pine-apple, the banana, or the sugar-cane.

Railways.—These have their centre in Melbourne, and are divided into five systems. The total length in 1891 was 2788 miles; the total cost had been £35,518,871, of which £3,500,000 had been paid for from the consolidated revenue, and the balance derived from loans. The railways connect the capital with all the principal cities and towns of the coast and the interior, and by their junction with those of New South Wales and South Australia bring together Sydney and Adelaide.

Finance, Commerce, &c.—The fiscal policy is protective, and heavy duties are imposed upon almost all imported articles of consumption. The total imports for 1891 were valued at £21,622,000, and exports at £15,679,000. The large excess of imports over exports is due first to Victorian capital being invested to a large extent in the neighbouring colonies, and secondly to the loans which during recent years have been contracted by Victoria on public, municipal, and private account. It is difficult to obtain exact information about the last item, but the public debt was in 1891 £44,377,693, upon which the annual interest was £1,683,655, and the borrowings on account of municipalities, harbours, &c. were £6,444,400. Of the total debt £31,973,519 had been borrowed for railways, £6,515,039 for water-works, and £1,105,557 for state school buildings. Of the imports in 1890 £9,607,193 were from the United Kingdom, £9,846,678 from British possessions, including the Australasian colonies, India, Mauritius, and Hongkong. The exports in 1890 included, amongst Victorian produce, wool valued at £2,443,483; gold specie, £2,223,065; gold bullion, £516,438; live-stock, £476,717; leather, £212,910; breadstuffs, £393,125; grain, £151,272; apparel and slops, £167,028; skins, £159,164; tallow, £158,851.

The revenue for 1891 was £8,342,737, and the expenditure £9,550,000. In 1890 the revenue was £8,519,159, and the expenditure £9,645,737. Of this latter amount £3,630,814 was raised from taxation, of which customs contributed £2,658,010;

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excise, £137,332; duties on estates of deceased persons, £400,150; stamps, £230,000; and land-tax, £121,604. The other items of revenue were rent and sales of crown-lands, £579,776; railways, £3,134,066; water-supply, £260,227; post-office, £353,684; and telegraphs, £172,716. The expenditure was for general government, £432,211; judicial and legal, £243,856; police, £265,149; gaols, £71,146; naval and military, £350,823; education, including buildings, £1,029,214; charitable institutions, £316,140; administration of crown-lands, £332,985; railways, working and administration expenses, £2,511,106; construction account, £88,688; water-supply, £68,850; other public works, including a subsidy of £450,000 to municipalities, £1,034,381; ports and telegraphs, £709,328; interest, £1,548,145; redemption of loans, £276,100; customs and harbours, £124,132; other expenditure, £243,583. It will be seen that the public revenue and expenditure include many items which in other countries are in the hands of private individuals, of public companies, or of municipalities.

Political.—The executive government is in the hands of a governor chosen by the sovereign, who has a salary of £10,000 per annum, assisted by a ministry appointed by the governor, but responsible to the legislature, and only holding office so long as it commands a majority therein. The parliament consists of three estates: the governor; the legislative council of forty-eight members, who must possess, and are elected by persons who enjoy, a property qualification; and a legislative assembly of ninety-five members, who have no qualification, and are elected practically by universal suffrage of all male adult residents of British nationality; but persons possessing freeholds or leaseholds have a vote in each electorate in which they hold property. Members of the legislative assembly receive a salary of £300 per annum. Geographically the colony is divided into thirty-seven counties, but for purposes of administration it consists of sixty urban municipalities, called cities, towns, or boroughs, and 134 rural municipalities or shires, in all of which every ratepayer has one or more votes according to the amount of rates paid by him. The police are under the control of the central government, and number 1501 officers and men; and the defence force includes 5571 officers and men of all arms, with 5869 rifles and carbines and 132 pieces of ordnance. The fleet consists of fourteen vessels.

General Statistics.—Educational establishments are of four kinds: the Melbourne University, with three affiliated colleges in connection with the Anglican, Presbyterian, and Wesleyan churches, and, in 1890, 189 undergraduates and 591 students attending lectures; technical schools and colleges, including five schools of mines; an agricultural college, and working-men's college; and private and primary state schools. Primary education is free, secular, and compulsory, and 95½ per cent. of the children of school age are being educated at some portion of the year. The public library of Melbourne has 252,000 volumes, and there are public libraries or mechanics' institutes in every town. There is no state church, and no state assistance has been given to religion since 1875. Melbourne and Ballarat are the sees of Anglican bishops, and the Roman Catholic Church has an archbishop at Melbourne and bishops at Ballarat, Sandhurst, and Sale. The numbers of members of the principal denominations are Episcopalians, 417,183; Roman Catholics, 248,591; Presbyterians, 167,027; Methodists, 158,040; Baptists, 27,882; Independents, 22,110.

The charitable institutions include hospitals, benevolent asylums, orphanages, all supported and managed on the voluntary principle, but subsidised by the state. A branch of the Royal Mint was opened in 1872. In 1890 there were sixteen savings-banks, with 162,933 depositors, who held a credit balance of £2,230,767, and 314 post-office savings-banks, with credit balances belonging to depositors amounting to £1,790,750. There were thirty-two friendly societies, with 969 branches and 81,710 members, with assets amounting to £788,128.

The *population* at the census taken on April 5, 1891, was males, 599,172, and females, 541,233, of whom 7761 males and 376 females, including half-castes, were Chinese, and 731, including half-castes, were aborigines. The most extraordinary feature in the census was the large proportion of the population who lived in the towns. Thus, 684,258 people resided in urban municipalities which had an area of only 632 sq. m., giving 1083 persons to the square mile, and only 456,147 in the rural municipalities, which had an area of 87,252 sq. m., or 5·2 to the square mile. The greater number of these townspeople lived in and around the capital, the population of greater Melbourne being 490,902; while 40,849 resided at Ballarat, 36,020 at Sandhurst, and 22,694 at Geelong, no other town having a population of 10,000.

See, besides books cited at AUSTRALIA, Levey's *Australian Encyclopædia* (1892); Hayter's *Notes on Victoria*; Thomson's *Illustrated Handbook* (1886); Walch's *Victoria in 1880* (1881); Brough Smith, *The Aborigines of Victoria* (1878); M'Coy, *Natural History of Victoria* (1878 *et seq.*); Smythe, *The Gold Fields and Mineral Districts of Victoria* (1869); Jenks, *The Government of Victoria* (1891); for history, Bonwick, *The Port Phillip Settlement* (1883); Labillière, *Early History of Victoria* (1879); Shillinglaw, *Historical Records of Port Phillip* (1879); Westgarth, *Australia Felix* (1864); and Turner's *History of Victoria*.

Victoria. See HONG-KONG; also CAMEROONS.

Victoria, capital of British Columbia, is charmingly situated near the south-east extremity of Vancouver's Island. Esquimalt (q.v.) is 2 miles distant. Victoria possesses, besides the government buildings, a cathedral, public library, hospitals, electric trams and lighting, a fine park on Beacon Hill, and a number of factories. There is a Chinese quarter. Pop. (1881) 5925; (1890) 16,841.

Victoria, (1) a seaport of Brazil, capital of the state of Espirito Santo, on an island in Espirito Santo Bay, which admits ships drawing 14 feet. Pop. 5000.—(2) Capital of Tamaulipas state, in Mexico, prettily situated at the base of the Cordillera. Pop. 8000.—(3) A town of Guzman Blanco state, in Venezuela. Pop. 12,000.

Victoria, a genus of plants of the natural order Nymphæaceæ, resembling the common water-lily, but most nearly allied to the genus Euryale, and distinguished from it particularly by the deciduous tips of the calyx, and the sterility of the innermost stamens. Only one species is yet known, *V. regia*. Seen by Hänke about 1801, by Bonpland, D'Orbigny, and others, it was first described in 1832 by Pöppig, who observed it in the river Amazon; and it was found by Schomburgk and others in many rivers of the north-east of South America. Its leaves are peltate, circular in outline, float upon the water, and attain a diameter of 5 to 6 feet; have the margin turned up all round about 2 inches high; are of a purplish colour on the under side, and there exhibit a sort of wicker-work of very prominent veins, furnished with prickles. The flowers rise amongst the leaves upon prickly stalks. They are more than a foot in diameter, white, internally rose-coloured, and are very fragrant. The fruit is a capsule, almost globose, with a depression on the top about half the size of a man's head, fleshy within, and

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divided into numerous cells, full of round farinaceous seeds, which are an agreeable article of food. The plant is therefore called *Maïs del Agua*,

Fig. 1.—Victoria regia.

or Water Maize, in some parts of South America. To the cultivation of this plant special hothouses have been devoted at Kew, Chatsworth, Crystal Palace, and other places in Britain, and elsewhere in Europe, and it was successfully cultivated and flowered in a heated tank in the open air in a nursery at Chelsea in 1851 and a few years subsequently. It has been introduced into India from seeds produced in England.

Fig. 2.—Flower of *Victoria regia*.

Victoria and Albert, Order of. See Orders of Knighthood.

Victoria Bridge. See Bridge, p. 441.

Victoria Cave, 2 miles N. of Settle in Yorkshire, is situated in a cliff 900 feet above the Ribble. It was discovered in 1837; and exploration has revealed in it bones of the elephant, hyæna, rhinoceros, bear, deer, horse, badger, &c., with implements and pottery of Roman-Celtic date.

Victoria Cross, a decoration instituted at the end of the Crimean war in 1856, and conferred on members of the British naval and military services who have performed, in presence of the enemy, some signal act of valour or devotion to their country. Non-military persons who have served as volunteers against an enemy are also eligible. The general distribution of the crosses earned in the Crimean war (to 62 personally) took place in 1857; and the distinction has since been conferred from time to time. The Victoria Cross is in the form of a Maltese cross, and is made of bronze. In the centre is the royal crown, surmounted by the lion, and below, on a scroll, the words 'For Valour.' The ribbon is blue for the navy, and red for the army. On the clasp are two branches of laurel, and from it the cross hangs, supported by the initial 'V.' An additional act of exceptional bravery may be marked by a bar on the ribbon. The decoration is accompanied, in the case of non-commissioned officers and men, by a pension of £10 a year, and £5 is added for each bar. See works by R. W. O'Byrne (1880), W. Richards (1891), and M. Gerard (1891).

Victoria Cross.

Victoria Falls. See Zambesi.

Victoria Nyanza, a great fresh-water lake in East Central Africa, situated on the equator, and on the meridian of 33° E., has an area of over 30,000 sq. m., or about the size of Ireland. It lies about 3880 feet above sea-level. The geological evidence points to the origin of its basin having taken place at a very remote period, a number of terrace-like faults along the western shores suggesting a series of immense landslips as a probable cause of the formation of the hollow which now contains the lake. The traces of volcanic action do not seem sufficient to account for so large a depression. The prevailing rocks are gneiss and schists, with porphyritic granite at the south extremity, and some lava and ironstone towards the north. The igneous area is, upon the whole, barren and desolate looking, the remainder of the basin being clothed with luxurious tropical flora, exceedingly varied in character. This variety is, perhaps, most strikingly exhibited on some of the islands. The fauna is also varied, the number of alligators frequenting the waters being very large. Hippopotami, although less frequently met with, are exceedingly fierce, and are held in great dread by the native boatmen. The water is good and fresh, although somewhat insipid to the taste, and frequently assumes a dirty white colour. The lake is drained by the Nile, and its chief feeders are the Kajera, the Nzoia, the Shimiyu, and the Katonga. As these are all comparatively insignificant streams, and the evaporation from such a large body of water in an equatorial climate must be very great, it is supposed that the lake draws the larger part of its supply from springs in its bed. Tides have lately been noticed along the shores, the rise lasting from about half an hour to an hour in time; from such observations as have been made, the winds do not appear to exercise much influence upon this curious phenomenon. The natives assert that a periodical rise and fall in the level of the lake takes place at intervals of about twenty-five years, and the water-markings along the coast, noted by recent travellers, are believed to lend an appearance of truth to the statement. Cyclonic storms, accompanied by thunder and lightning, are common, and occur most frequently in the month of August. Fishing is mostly carried on by the use of the rod and line, except in Lower Kavirondo and among the Ba-Sesse people, where grass mats and basket traps are used as nets. The lake, whose native name is Ukerewe, was discovered by Speke in 1858, visited by him and Grant in 1861–62, and subsequently partly explored by Stanley (1875), Mackay, Thomson, and others.

Victoria University. See Owens College.

Victualling. All officers and men in the British navy are borne, when on full pay, on the books of one of H.M. ships, whatever the duties may be on which they are engaged, and are entitled to rations, or compensation in money if their rations are not issued. Every person actually serving on board a ship has his rations issued, and is then said to be 'victualled' on board. Should any officer or man be only borne on the books for pay, and be employed on other service away from the ship, he is not 'victualled, but receives compensation

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in lieu. All officers and men are entitled to the same rations, and to the same compensation in lieu; they are allowed to leave behind (i.e. not draw) a certain proportion of their rations, receiving a money allowance instead, except in the case of fresh meat and bread, which must always be taken up. The paymaster has charge of the victualling stores, and is responsible for the account. Under that head are included not only the provisions, but all the clothing, and the soap and tobacco. The victualling department is under the administration of an official at the Admiralty styled the Director of Victualling. There are three large victualling yards in England, the Clarence yard at Portsmouth, the Royal William at Devonport, and the Royal Victoria at Deptford, the last the largest and most important. From Deptford all the depôts abroad are replenished, while most of the biscuit and chocolate is made there, and beef salted. Deptford was first established as a dockyard and depôt for stores in 1573. The space occupied by the victualling-yard is about 19 acres, with a river frontage of 1700 feet, and mean depth of 1000 feet. The number of men employed varies, but during war upwards of a thousand would be required. Till 1869 the victualling-yards were under the charge of a captain-superintendent, but since then all these establishments have been placed under the civil administration of the Admiralty. The Clarence and Royal William yards are both supplied from Deptford, and re-issue to ships as required. There is also a large victualling establishment at Malta for the service of the Mediterranean squadron, and smaller depôts on other foreign stations. Fresh beef, bread, and vegetables are always obtained at other ports both at home and abroad from local contractors. The victualling of men in merchant-ships is now regulated by the Merchant Shipping Acts, and can be made the subject of inquiry either by magistrates or Board of Trade officials at home, or by the consular authorities abroad, in the event of any of the crew being discontented and lodging a formal complaint.

Victualling-bill, a customs document warranting the captain of an outward-bound vessel to ship such bonded stores as are needed for the voyage.

Vicuña (*Auchenia vicugna*), a species or variety of the South American genus Auchenia (allied to the camels), which also includes the llama, alpaca,

Vicuña (*Auchenia vicugna*).

and the guanaco. Unlike the first two, but like the last, the vicuña lives wild. It is somewhat smaller than a European red deer; its wool is light brown with some white beneath. It frequents the most desolate parts of the Cordillera, at great elevations, and delights in a kind of grass, the Ychu (*Stipa Ychu*), which abounds there in moist places. The small herds commonly include from six to fifteen females with one male. When the females are quietly grazing, the male stands apart, and carefully keeps guard, giving notice of danger by a kind of whistling sound, and a quick movement of foot. When the herd takes to flight, the male is said to cover their retreat, often pausing to observe the motions of the enemy. The vicuña is a very active animal, like the chamois or the antelope. The Indians seldom kill it with fire-arms, but set up a circle of stakes, about a mile in circumference, into which the vicuñas are driven. The soft wool is much valued for weaving.

Vida, MARCO GIROLAMO, a 16th-century Latinist, was born at Cremona between 1480 and 1490, studied theology, was favoured by Leo X., who gave him a priory, and by Clement VII. was made Bishop of Alba, where he died 27th September 1566. He was at the Council of Trent, and was a friend of Cardinal Pole. Vida wrote Latin orations and dialogues, but is known mainly as a poet, remarkable for the grace of his Latin style rather than for his force of thought; his chief poems being *Christias* (1535) and *De Arte Poetica* (1527), others being on the silkworm and on the game of chess. There is a monograph by Lancetti (1840); and see Symonds, *The Renaissance in Italy.*

Vidocq, EUGÈNE FRANÇOIS, 'the detective,' was born a baker's son at Arras on 23d July 1775, and as a boy persistently robbed the till of his father's shop. He was sent to the house of correction, but signalised his release by decamping with £80. Of this a sharper relieved him at Ostend; and to keep himself in life he engaged himself to sweep the cages of a travelling menagerie. From this post he was advanced to that of tumbler and acrobat; and a further promotion was intended him to a supposed savage, eating raw flesh and drinking blood. As he chose to decline the appointment, his services were dispensed with, and he returned home. Entering the army, he attained the rank of corporal, and served with some credit in Belgium and elsewhere, till a wound disabled him. For some years he seems to have lived as a scoundrel at large, occupying himself in swindling and disreputable love-affairs. In 1796 he turned up in Paris, and being detected in forgery was sentenced to eight years as a galley-slave. Before his term of durance had expired he found means to escape, and became one of a band of highwaymen. They, on discovering that he was an escaped galley-slave, declined, it is said, any further acquaintance, whilst exacting from him a solemn oath not to betray them. Vidocq took the oath, and instantly delivered the whole gang into the hands of the authorities. Then repairing to Paris about 1808, he offered his services to the authorities there as a spy on the criminal classes. His advances were at first coolly received, but gradually he made his way; and in 1812 a 'Brigade de Sureté' was organised, with Vidocq as chief. Consisting at first of only four men, by degrees it was enlarged to twenty-eight; and its efficiency was something marvellous. Suspicions, however, grew rife that Vidocq was himself the originator of many of the burglaries he showed himself so clever in hunting out, and in 1825 he was superseded. He then started a paper-mill, and in 1832 a private detective office, which soon, however, was closed by the authorities. He died in Paris, May 1857. His *Mémoires* (1828), even if really by himself, are certainly untrustworthy.

Vienna (Ger. *Wien*), the capital and largest town of the Austrian empire, is situated in Lower Austria, on the Danube Canal (*Donau Kanal*), a south branch of the Danube. The small river

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Wien flows through part of the town to join the canal. Vienna proper (pop. in 1880, 726,000; in 1890, 831,472) consists of the Inner City (*Innere Stadt*) and eight districts or sections completely surrounding it—viz. Leopoldstadt, Landstrasse, Wieden, Margarethen, Mariahilf, Neubau, Alsergrund, and Favoriten. These, with the exception of the last, an artisans' quarter, are enclosed by fortifications known as the Lines (*Linie*), though that name is now usually confined to the fifteen gates of the fortifications. Immediately beyond the Lines are nine populous suburbs included (since 1890) within the Vienna police-district, which has a total area of 51 sq. m., and pop. (1890) of 1,364,548. The irregular hexagon formed by the Inner City was until 1858 enclosed by an inner line of fortifications, the site of which is now occupied by the Ringstrasse, a series of handsome boulevards, 55 yards wide, which bound five of its sides. The sixth side is bounded by the Franz-Josefs Quay, on the Danube Canal. Though Vienna contains buildings of the 14th and even of the 13th century, it is, in its present form, essentially a modern city; nearly all the most conspicuous and pretentious public buildings date from the later half of the 19th century. Modernity too is characteristic of the Viennese; they are sprightly, good-tempered, and pleasure-loving, fond of music, dancing, and the theatre. The Inner City and the Ringstrasse are the handsomest and most fashionable quarters. In the former are the cathedral of St Stephen (1300–1510), with a tower 450 feet in height; the Hofburg or imperial palace, a large and irregular pile of very various dates; and many palaces of the nobility. On one side or other of the Ringstrasse rise the Exchange; the University (1874–84); the huge Gothic New Rathhaus (1873–83), built at a cost of over three-quarters of a million sterling; the Parliament House; the Supreme Law Courts; the Imperial Museums of Natural History and of Art (1872–86), twin buildings on either side of the imposing monument of the Empress Maria Theresa (unveiled 1888); the imperial Opera-house; the Academy of Art; the Austrian Museum of Art and Industry, &c. In other parts of the city are the Arsenal; the Josephinum, a medical college founded in 1784; the Votive Church, an admirable specimen of modern Gothic, built in 1856–79 to commemorate the emperor's escape from assassination in 1853; and many other handsome sacred and secular edifices. Vienna is well provided with public parks, the largest being the Prater (7 sq. m.), one of the finest parks in Europe, opened in 1766. In educational, scientific, artistic, and benevolent institutions the city is very rich. The university, founded in 1365 and renowned throughout the world as a medical school, has a teaching-staff of 350 and over 6000 students. The magnificent public picture-gallery, formerly in the château of Belvedere, now in the Museum of Art, is specially famous for its unrivalled examples of the Venetian school, Rubens, and Dürer. There are also several noted private galleries. The Public Hospital, with 2000 beds, is perhaps the largest hospital in Europe.

Vienna is the chief industrial city in the empire, the factories being mostly in the districts of Neubau and Mariahilf and outside the Lines. Machinery, scientific and musical instruments, artistic goods in bronze, leather, terra-cotta, porcelain, &c., bent-wood furniture, meerschaum-pipes, &c. are among the noted manufactures of Vienna. As a centre of trade and finance Vienna is no less important. Grain, flour, cattle, seeds, wines, and manufactured goods of all kinds are annually handled here to an immense aggregate value. Over 2½ million pounds were spent in 1868–81 in regulating the channel of the Danube so as to render the river navigable at all times, and a new mercantile quarter is gradually springing up between the canal and the main stream. The chief local authority is the Gemeinderath, or city council (consisting of a burgomaster, two vice-burgomasters, and 120 councillors), which is assisted by local committees or councils in the various districts.

Vienna occupies the site of the Roman *Vindobona*, which was established in 14 A.D. as the successor of the Celtic settlement of *Vindomina*. The beginning of its present importance, however, dates only from the period of the Crusades, which directed a steady stream of traffic through it. In 1276 it became the capital of the Hapsburg dynasty. The famous siege of Vienna by the Turks lasted from July 14 to September 12, 1683, when it was relieved by John Sobieski of Poland.

Treaties have been concluded at Vienna in 1738, between the Emperor Charles VI. and the Infanta of Spain as to the kingdom of the Two Sicilies; in 1809, between Napoleon and the Austrians, after the defeat of the latter at Wagram; in 1864, settling affairs after the war of Prussia and Austria against Denmark; and in 1866, between Francis Joseph of Austria and Victor Emmanuel of Italy, ceding Venetia to Italy. The great Congress of Vienna (20th September 1814 to 10th June 1815) met to regulate the affairs of Europe after the overthrow of the Napoleonic empire, and restore the 'balance of power.' Alexander I. and Nesselrode were there in the interests of Russia; the king of Prussia was supported by Hardenberg; Castlereagh, and afterwards Wellington, represented Britain; Metternich was Austrian plenipotentiary; Talleyrand secured a hearing for France; Spain, Portugal, Sweden, Denmark, Rome, and the minor German states were also represented. The chief final outcome was that Austria obtained Lombardy, Venetia, Illyria, Dalmatia, Tyrol, Vorarlberg, Salzburg, and East Galicia; Prussia the province of Saxony, Posen, Swedish Pomerania, Westphalia, and the Rhenish Province; Hanover, extended in area and made a kingdom, fell to the Hanoverian dynasty in Britain; Britain secured Malta, Heligoland, Cape Colony, and Mauritius, and the protectorate of the Ionian Islands; Belgium and Holland were united as the Kingdom of the Netherlands; Norway was confirmed to Sweden; the Duchy of Warsaw (Poland) was made over to Russia, and the republic of Cracow was constituted; the neutrality of Switzerland was guaranteed, and Neuchâtel (under Prussian sovereignty) added to the confederation; the German confederation was constituted with numerous internal rearrangements; and the former ruling houses were reinstated in Naples, Sardinia (to which Genoa was annexed), Tuscany, and Modena, Parma being given to the ex-empress Maria Louisa; the papal see recovered nearly all its possessions; and France was restricted to very nearly the territory it possessed before the Revolution. The signing of the treaty (9th June) was hastened by the news of Napoleon's return from Elba. A second, but futile, congress took place for a few days in 1855, representatives of Britain, France, Turkey, and Russia being present.

For the topography of Vienna, see works by Weiss (1886), Waagen (1867), Lützow (1878), and guidebooks by Forster, Seis, Bermann, Maurer, Winkler, &c.; histories by Hormayr (1824), Weiss (1882), and Bermann (1880); on the congress there are, besides the Acts (9 vols.), works by Flassan (Par. 1829) and Angeberg (Par. 1864).

Vienne, a dept. in the west of France, constituted mainly of the old province of Poitou, lies between Indre and Deux-Sèvres; area, 2691 sq. m.; pop. (1881) 340,295; (1891) 344,355. The Vienne, an affluent of the Loire, is the principal river, and has the Creuse as its chief tributary. The surface is mostly flat, with a gradual slope

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toward the north. The country consists almost wholly of fertile plains, fine pasture-lands, and extensive forests. The mineral riches comprise iron, manganese, and quarries of stone, including lithographic stones. The dept. is divided into the five arrondissements of Poitiers, Châtellerault, Civray, Loudun, Montmorillon. Poitiers is capital.

Vienne, one of the most ancient towns of France, in the dept. of Isère (far away from the dept. of Vienne), on the left bank of the Rhone, 19 miles S. of Lyons by rail. The river Gère passes through the town, and here joins the Rhone, after having supplied motive-power to a number of mills and factories. Vienne was the chief town of the Allobroges, is mentioned by Cæsar, and by Martial, who terms it *opulenta Vienna;* in the time of the Roman emperors it was the rival of Lyons. Besides numerous water-conduits, &c. of Roman construction, there are a Corinthian temple of Augustus and Livia, remains of a theatre, and an obelisk, called L'Aiguille, 72 feet high; and the museum contains many relics of Roman antiquity. The cathedral of St Maurice, partly Romanesque, partly Gothic, was built in 1107–1251; St Peter's dates from the 6th century. The town was prominent under the Burgundian princes, and its archbishop disputed with his neighbour of Lyons the primacy of Gaul. In 1312 a council was held here, in which Pope Clement V. pronounced the suppression of the order of the Templars. There are manufactures of woollens, silk, paper, leather, and iron goods, and trade in grain and wine. Pop. (1872) 21,430; (1891) 22,814.

Vienne, HAUTE, an interior dept. of France, south-east of Vienne, bounded on the W. by the depts. of Vienne, Charente, and Dordogne. Area, 2130 sq. m.; pop. (1872) 322,447; (1891) 363,182. It is watered by the Vienne and its tributaries. The surface is for the most part level, though not fertile, but is traversed by ranges of low hills, including the Monts du Limousin. There is much cattle-breeding. Kaolin is the chief mineral produce, and much porcelain is made. The dept. is divided into four arrondissements—Limoges, Bellac, Rochechouart, and Saint-Yrieix; capital, Limoges.

Viersen, a town of Rhenish Prussia, 20 miles NW. of Düsseldorf by rail, with manufactures of plush, silk, cotton, and flax. Pop. (1890) 22,143.

Vierzon Ville, a French town in the dept. of Cher, 20 miles NW. of Bourges by rail, with manufactures of porcelain, glass, &c. Pop. 10,559.

Vieta, FRANCISCUS (*François Viète*), a great French mathematician, was born at Fontenay-le-Comte, near La Rochelle, in 1540. He studied law at Poitiers, practised there as an advocate, was councillor of the *Parlement* of Brittany, under Henry IV., of that at Tours, next a privy-councillor to the king, and died at Paris in February 1603. We are told that he discovered the key to a Spanish cipher of over 500 characters. Schooten collected most of his writings (Leyden, 1646).

Vieuxtemps, HENRI, violinist and composer, was born 20th February 1820 at Verviers in Belgium, began to give concerts in his thirteenth year, and after completing his studies at Vienna and Paris spent most of his time in travelling from place to place as a performer till in 1870 he became a teacher in the Brussels conservatoire. He retired in 1873, and died 6th June 1881. His works comprise concertos, fantasias, and dances for the violin. See Kufferath, *Henri Vieuxtemps* (Brussels, 1883).

Vigan, LE, a town of France, dept. Gard, 45 miles WNW. of Nîmes by rail. Pop. 4350.

Vigevano, a town of Northern Italy, 20 miles NW. of Pavia by rail, with an old cathedral, silk manufactures, and some trade. Pop. 13,684.

Vigfusson, GUDBRAND, Scandinavian scholar, was born in the district of Broadforth, Iceland, 13th March 1827, and studied at Copenhagen, where he lived from 1849 till 1864. In 1856 he was appointed one of the stipendiaries of the Arna Magnæan Commission. His master in the chosen work of his life was John Sigurdsson, to whom he dedicated his edition of *Eyrbyggja Saga* (Leip. 1864). Earlier and later works were his *Timatal* (1855), an essay in Icelandic on the chronology of the sagas; *Biskupa Sögur* (1858–78); the *Forn-Sögur* (with Th. Möbius, 1860); the *Flatejarbók* (with Unger, Christ. 1860–68); the *Icelandic Dictionary* (1873), undertaken by Cleasby, and carried on from 1864 by Vigfusson; the *Sturlunga Saga* (2 vols. Oxford, 1878); and the magnificent *Corpus poeticum boreale* (with F. York Powell, 2 vols. Oxford, 1883). In 1864 he had settled in London, whence he moved to Oxford, where he was appointed in 1884 lector in Icelandic, and died January 31, 1889. He had received the doctorate from Upsala in 1877, the order of the Dannebrog in 1885.

Vigil, originally the watch kept, with public prayer, on the night before a feast, is traceable in the very earliest centuries, and is one of the usages against which Vigilantius inveighs, and which Jerome vindicates in his reply, though he admits the abuses that often accompanied it, and which ultimately brought about its suppression. The old observance survives in the Roman Church now only in the Matins and Lauds and the midnight mass before Christmas, and the term is applied to the day and night preceding a feast, on certain of which fasting is obligatory (in England, on the vigils of Whitsunday, the Assumption, SS. Peter and Paul, All Saints, and Christmas). Vigils are marked in the Book of Common Prayer; no special services are appointed for them, but the collect of the next day is used at evensong. The 'watch-night' service at New Year (q.v.) is analogous.

Vigilance Societies, in the United States, include not only Regulators and other extreme exponents of Lynch Law (q.v.), but also the illegal associations which spring up from time to time in all parts of the country for the compulsory improvement of local morals, and the punishment of those who either refuse or fail sufficiently to reform their lives. Such organisations as the White Caps, at home in the eastern and central states, have for their professed objects the suppression of vice and idleness; they send formal warnings to those citizens whom they consider to be neglectful of their homes, too partial to card-playing, drinking, &c.; and if this warning be disregarded, inflict such punishment as whipping, destruction of property, &c. The methods of the modern White Caps are the same as those of the Ku-Klux Klan (q.v.).

Vigilantius, an opponent of monachism and of the worship of martyrs and relics, was born at Calagurris in western Gaul in the later half of the 4th century. Ordained a presbyter at Barcelona in 395, he journeyed to Jerusalem carrying a recommendation from Paulinus of Nola to Jerome, whose whole theological system was as completely repellant to him as his vehement and intolerant temper. From Jerome's *Contra Vigilantium* we gather that he denounced the worship of martyrs and relics as a relapse to paganism, vows of celibacy and poverty as unnatural and creating a fictitious scale of morality. See Lindner, *De Joviano et Vigilantio* (Leip. 1840).

Vignette, properly an ornament like vine-twigs and leaves with grapes; but the name is now given to any small engraving (as on the title-page of a book), design, or photograph which is not circumscribed by a definite border.

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Vigny, ALFRED VICTOR, COMTE DE, French author, born of ancient family during his parents' imprisonment in the prison at Loches (Indre-et-Loire), 27th March 1797, entered the army at the Restoration, and served fourteen years. Garrison life wearied a soul athirst for glory, but his pride found a solitary consolation in verse. As early as 1822 he published anonymously a small volume of verse, followed in 1824 by *Eloa, ou la Sœur d'un Ange*, an exquisite piece of mystic phantasy. Before the Revolution of July he had published his collected *Poèmes antiques et modernes* (1826), containing *Moïse* and *Dolorida; Cinq Mars* (1826), a historical romance; a translation of *Othello* (1829); and a drama, *La Maréchale d'Ancre* (1830). After that year he published only works in prose: *Stello* (1832), *Grandeur et Servitude Militaires* (1835), and a drama, *Chatterton* (1835)—the highest moment of his fame. From that time he ceased not to write but to print. He left a volume of verse—*Destinées*—published in 1864, which contains some of his finest and most virile work, and a collection of personal notes, printed with doubtful wisdom by Louis Ratisbonne under the title *Journal d'un Poète* (1867). While still young he attached himself to the Romanticists, with Hugo, Deschamps, Mme. Desbordes-Valmore, and Mdlle. Delphine Gay. But he was never a militant or thorough-going member of the party—'he retired,' says Sainte-Beuve, 'to his ivory tower before the heat of the day.' His *Cinq Mars* was a romance based on the most tragic of the crimes of Richelieu, inspired by Scott, but intended to be minutely true to history throughout. The author's connection with the theatre led to an equivocal friendship with Mme. Dorval, commencing about the close of 1830, but the woman's heart soon found poetry a poor substitute for passion, and the tragedy left the poor idealist stripped of his last illusion. In 1845 Vigny was gratified by election to the Academy, on which occasion he made a long and wearisome address, which was listened to with unconcealed impatience. Thereafter till the close he lived but little in the world, in familiarity with no one, not even himself, his thoughts wrapped up in a pessimistic gloom from which he found escape only by the avenues of art. His was that profoundest kind of moral misery which needs no external reason for its being, incurable because itself its own poison. He died at Paris after the long agony of cancer, 17th September 1863. Vigny's work was elegant but cold. No poet has had grander conceptions than the few fundamental ideas that inform his work, and it is not so much inspiration as meditation that gives the key-note to all his poetry. 'It is formed,' says M. Montégut, 'not as beautiful living things are born, by fervent generation, but in the way those lovely, precious, and cold things are produced—pearls, coral, the diamonds, to which they have a close affinity—by agglutination, slow cohesion, invisible condensation.' His fundamental defect as a poet has been well stated by M. Faguet to be not by any means want of imagination, but rather a certain richness and suppleness of imagination, the result of which is not only that one of the most vigorous thinkers amongst poets has produced so little, but also that his most perfect work is ever marred by incompleteness and inequality. Vigny the artist is inferior to Vigny the poet; his poetic execution to his creation of poetic ideas. Quite unlike Hugo, whose magnificent execution casts a splendid veil over a certain fundamental poverty of ideas. But if a poet's domain be small, it is something if it be all his own, and Alfred de Vigny the poet was at least original. Perhaps, when all is said, Montégut is right in putting the three novels which compose *Servitude et Grandeur Militaires* as his finest work. 'The form of this book is noble as its thought, and simple as the souls whose silent sacrifice and obscure heroism it relates. . . . The day on which he wrote it he took counsel only with his own inborn nobility of nature, and gave their *congé* to all his feelings of bitterness and melancholy, as if to a troop of importunate and troublesome guests who hindered him from discovering his true self. Is it not piquant to see given by the mouth of a misanthrope himself, to the pessimistic doctrines of the misanthropes on human nature, the most eloquent denial they have received in our time?' An exquisite if uncertain artist, Vigny remained true to his fundamental definition, 'L'art est la vérité choisie.' To him genius was a sublime and fatal gift, which imprisoned him in grandeur, solitude, and sadness; the whole universe an arena of infamy and wrong; the stern decrees of fate to be endured with stoicism if possible; their individual victims to be regarded with a pity, profound indeed, although half begotten of contempt. Vigny married an Englishwoman (Lydia Bunbury) in 1828, and the influence of English taste is as marked in his work as in that of his contemporary, Alfred de Musset; indeed Gantier, in speaking of what he calls 'the intellectual fatherland' of his contemporaries, expressly says 'Musset and Vigny are English.'

See the monographs by Maurice Paléologue, in 'Les Grands Ecrivains Français' (1891), and M. Dorison (1892); and the earlier studies by Sainte-Beuve, *Portraits Contemporains* (vol. ii.), *Portraits Littéraires* (vol. iii.), and *Nouveaux Lundis* (vol. vi.); and Caro, *Poètes et Romanciers;* but especially Émile Montégut, *Nos Morts Contemporains* (série i.), and Émile Faguet, *Dix-Neuvième Siècle: Études Littéraires.*

Vigo, a seaport on the north-west coast of Spain, on a deep bay or inlet, 20 miles SW. of Pontevedra by rail. Its beautiful situation and fine climate make it an admirable health-resort. Pop. (1887) 15,044. The Bay of Vigo has an inland sweep of 20 miles, and is 5 miles wide at its mouth. Vigo was taken by Drake in 1585 and 1589, and by Lord Cobham in 1719; and in 1702 the Spanish galleons, defended by a French fleet, were captured or destroyed by a British and Dutch force under Lord Ormonde and Rooke. See CASSITERIDES.

Vihara. See INDIA (ARCHITECTURE), p. 108.

Vijayanagar, a ruined city 8 miles in circuit, in Madras province, about 40 miles to the NW. of Bellary, in a plain encumbered with granite rocks, many of which have been rudely sculptured into a variety of forms. After having been for two centuries the metropolis of a powerful Hindu kingdom, Vijayanagar was sacked and ruined by the Mohammedans of the Deccan in 1565. At that date it is described as 24 miles round. The ruins of the ancient city, the building of which was begun in 1336, now cover 9 sq. m. The modern village on its site is called Hampi; pop. 700.

Viking (Dan.; Icel. *vikingr;* A.S. *wicing*), a name given to the piratical Northmen who infested the coasts of the British Islands and of France in the 8th, 9th, and 10th centuries. This word is quite unconnected with 'king,' being derived from the Scandinavian *vik*, 'a bay' (the same which appears in the names Lerwick, Berwick, &c.), and this class of marauders were so called because their ships put off from the bays and fiords. See NORTHMEN.

Vikramaditya. See INDIA, Vol. VI. p. 117.

Vilâyet. See TURKEY, p. 330.

Vilkomir, a town of West Russia, in Kovno, 130 miles SE. of Riga; pop. 16,244.

Villafranca, a town of Italy, 9 miles SW. of Verona by rail, where in 1859 peace was concluded between Austria and France; pop. 3986.

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Village Communities, the means by which many scholars contend that great part of Europe must have been brought into cultivation. A clan of settlers took a tract of land, built their huts thereon, and laid out common fields, which they cultivated in common as one family. The land was divided out every few years into family lots, but the whole continued to be cultivated by the community subject to the established customs as interpreted in the village-council by the sense of the village-elders. This may still be seen in the villages of Russia, and even in some parts of England may still be traced the ancient boundaries of the great common field, divided lengthwise into three strips (one fallow, the two others in different kinds of crop), and again crosswise into lots held by the villagers. This theory, often called the Mark system, was started by Von Maurer in Germany, but mainly owes its currency to Sir Henry Maine, who in his work entitled *Village Communities in the East and West* (1871) pointed out close parallels in the archaic land communities in India. The first serious attack upon the theory was made by Mr F. Seebohm, in his work *The English Village Community Examined* (1883; 4th ed. 1890), which labours to prove that the ancient village community was not originally free, but traces back to the Roman manorial system of a community in serfdom under a manor with its lord. Fustel de Coulanges dealt Von Maurer's theory a still more deadly blow by turning against him the evidence of the Leges Barbarorum and early chartularies on which his argument mainly relied. He proves also that the Russian *mir* does not represent agrarian communism, the soil belonging not to it but to some one else, and the peasants merely paying rent collectively as well as cultivating the land collectively. The primitive *Mark*, the association of the Mark (*Markgenossenschaft*), the original common-land (*Gemeinland* or *Allmende*)—all the evidence for these he weighs and finds wanting, contending that the whole imposing structure of argument has been erected out of a series of misunderstandings, national communism having been confused with the common ownership of the family, tenure in common with ownership in common, agrarian communism with village commons.

Mr Gomme considers Lauder and Kells as surviving types of the tribal community in its most primitive form; besides the example of Hitchin, from which Mr Seebohm started working back, he examines the cases of Aston village, in the parish of Bampton, Oxfordshire, Chippenham in Wiltshire, Malmesbury, and others, his conclusion being that the village community is no modern institution, but one beginning far back in the history of human civilisation, and probably a phase through which all peoples have passed. In the hill cultivation and settlement, of which many traces remain, he sees evidence of pre-Aryan influence analogous to similar customs surviving in India. The community in its tribal form was the prominent feature, the village of serfs the subordinate: groups of kindred occupying their several homesteads and the lands around; small villages of serfs occupying cottage homes massed together, and using the lands around them in intermixed or run-rig occupation. Thus Mr Seebohm's formula, defining the English institution as a manor with a village community in serfdom under it, he would rewrite as a tribal community with a village in serfdom under it.

Besides the books named, see G. L. Von Maurer, *Einleitung zur Geschichte der Mark- Hof- Dorf- und Stadtverfassung* (1854), and *Geschichte der Markverfassung* (1856); E. Nassé, in *Cont. Rev.* for May 1872, and his *Agricultural Community of the Middle Ages* (1871); also E. de Laveleye, *Primitive Property* (Eng. trans. 1878); G. L. Gomme, *The Village Community* (1890); and Fustel de Coulanges, *The Origin of Property in Land* (Eng. trans. 1891). And see the articles FEUDALISM, GAU, LAND LAWS, RUSSIA (Vol. IX. p. 37).

Villareal, a Spanish town of 12,887 inhabitants, 40 miles NE. of Valencia by rail.

Villari, PASQUALE, historian, was born at Naples in 1827, took part in the revolution of 1848, and, after holding a professorship in Pisa and travelling in France and England, became professor of History at Florence in 1866. He has repeatedly sat in the Italian parliament, and in February 1891 became minister of Public Instruction. He has written on the legends that illustrate Dante, essays in criticism, &c., but his best-known works are the great lives of Savonarola (2 vols. 1859; 2d ed. 1887) and of Machiavelli (3 vols. 1877–82), both translated by his wife, Linda Villari (*née* White), an English lady who has written a series of novels, tales, and sketches (*Camilla's Girlhood, A Double Bond, In Change Unchanged, On Tuscan Hills and Venetian Waters*, &c.).

Villars, CHARLES LOUIS HECTOR, DUC DE, marshal of France, one of the most illustrious of the great captains of Louis XIV.'s time, was born at Moulins, 8th May 1653. He distinguished himself in the wars of the Low Countries, on the Rhine, and in Hungary, fighting against the Turks. From 1699 till 1701 he represented France at Vienna, and by his sleepless vigilance foiled the tortuous policy of the Austrian ministers. On his return he was employed in Italy under Villeroi, and was for the first time (1702) raised to independent command, when he was sent to succour the Elector of Bavaria. Towards the close of 1702 Villars crossed the Rhine, defeated the Markgraf of Baden at Friedlingen, and next year again crossed the Rhine, traversed the Black Forest, and joined the Elector. His bold scheme for advancing upon Vienna was defeated by what he regarded as the stupid obstinacy of his colleague, the Elector; and after his skill and genius had been taxed to the utmost to keep the Austrians at bay, and he had been relieved, he returned in disgust to France. He was next commissioned to put down the insurrection of the Camisards (q.v.). Villars was then sent to watch over the north-eastern frontier, which he successfully defended against Marlborough, who retreated; upon which Villars entered Alsace and captured the enemies' reserves of supplies and artillery. In 1708 he defeated all the attempts of Prince Eugene to penetrate into France. In 1709 he was sent to oppose Marlborough in the north; but at the commencement of the battle of Malplaquet (q.v.) he was severely wounded, and rendered unfit for service. But in 1711 he headed the last army France could raise, and with it fell upon the British and Dutch under Albemarle, who were entrenched at Denain (24th July 1712), carried their entrenchments sword in hand, and captured the most of them; he then turned upon Prince Eugene, and drove him under the walls of Brussels. This magnificent series of successes saved the honour of France, and brought about the peace of Rastatt (q.v.), which Villars signed as plenipotentiary, 6th May 1714. After the peace he became the principal adviser on military affairs and on questions of foreign policy; was a strong opponent of Law's financial measures; but through the intrigues of Fleury lost favour at court. The outbreak of war in 1732, however, brought out the old hero from his retirement, and he went to head the French army in the Milanese. The campaigns of 1733–34 showed that the weight of years had left Villars' military genius and spirit untouched; but discontent with his ally, the king of Sardinia, determined him to solicit his recall;

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and he accordingly set out for France, but fell ill at Turin, and died 17th June 1734.

See his *Mémoires* (ed. by De Vogüé, 2 vols. 1884–87), and the biographies by Anquetil (1784), Giraud (1881), and De Vogüé (1888).

Villarsia, a genus of plants of the natural order Gentianaceæ, the species of which are widely distributed over the world, and are either aquatic or marsh plants, with entire leaves and yellow flowers. *V.* (*Limnanthemum*) *nymphæoides* is a native of England, but rare; it is more common in many parts of Europe, from Denmark to the Mediterranean, and is very abundant in Holland, often covering large tracts of the canals with its beautiful flowers and leaves. *V. indica* is regarded as a valuable medicine in India, being given internally to persons bitten by cobra. Several species from South Africa and Australia are cultivated in British aquariums for the beauty of their flowers.

Villefranche, or VILLAFRANCA, a small port in the French dept. of Alpes Maritimes, 3 miles E. of Nice. The harbour, which is defended by forts, is much used by ships of war. The climate is very fine. Pop. 3295.—(2) Villefranche de Rouergue, in Aveyron, 70 miles NE. of Toulouse by rail, has a pop. of 7588.—(3) Villefranche-sur-Saône, in the dept. of Rhone, 20 miles NW. of Lyons, has cotton manufactures and a pop. of 12,463.

Villehardouin, GEOFFROI DE, marshal of Champagne, the first, and far from the least, of French historians, was born about 1160 at Villehardouin in Aube, took a distinguished part in the so-called Fourth Crusade—the complicated and entirely secular operations in alliance with Venice that established the Latin empire of Constantinople—became marshal of 'Romanie,' seigneur of Messinople in Thrace in 1207, and was dead before 1213. His famous *Conquête de Constantinople* relates with order and clearness the course of events from the preaching of the crusade in 1198 down to the death of his patron, the Marquis de Montferrat, in 1207. It is probable, as Gaston Paris says, that he did not write himself, and that we should take in its proper sense—which is not always the case in Old French—the word *dicter* which he uses several times in speaking of the composition of his book. The style is vigorous, direct, often singularly strong and graphic without effort or even consciousness; yet preserving from the preceding age something of the epic tone, it recalls the *Chanson de Roland* just as Herodotus recalls Homer. Sincere history as it is, it is of far greater value as literature than history, for it throws the strongest light upon the thoughts and feelings of the crusaders, especially the leaders. Strange to say, it is supplemented here by another prose narrative of a sharer in the crusade, Robert de Clari, whose book is much less admirable in style, but reveals the inner life of the crusaders of lower rank.

Editions are by Du Cange (1657), Dom Brial (1823), and especially N. de Wailly (1872; 3d ed. 1882). See Sainte-Beuve's *Causeries du Lundi*, vol. ix.

Villein. See SLAVERY.

Villemain, ABEL FRANÇOIS, scholar and critic, was born at Paris, June 11, 1790, and at twenty was appointed professor of Rhetoric at the Lycée Charlemagne, shortly after at the École Normale. He filled the chair of Eloquence at the Sorbonne (1816–26), held various government offices under Louis XVIII., was made a peer in 1831, and served as minister of Public Instruction under Soult and Guizot, retiring in 1840. He was long perpetual secretary of the French Academy, and died 8th May 1870.

His principal works are the invaluable *Cours de Littérature Française* (1828–30), *Mélanges* (1823) and *Nouveaux Mélanges* (1827), *Souvenirs Contemporains d'Histoire et de Littérature* (1853), *Choix d'Études sur la Littérature Contemporaine* (1857), *La Tribune Contemporaine, M. de Chateaubriand* (1857), *Essais sur le Génie de Pindare et sur la Poésie Lyrique* (1859). His *Histoire de Cromwell* (1819) and *Lascaris, ou les Grecs du XV. Siècle* (1825), brought him great popularity.

Villemarqué. See LA VILLEMARQUÉ.

Villena, a town of Spain, 25 miles NW. of Alicante by rail, with manufactures of linen and soap, and a pop. (1887) of 14,450.

Villeneuve, the name of numerous French towns, the largest Villeneuve-sur-Lot, or d'Agen, in Lot-et-Garonne, 15 miles N. of Agen by rail, with trade in wine and fruit and a pop. of 9339.

Villeneuve, PIERRE CHARLES JEAN BAPTISTE SYLVESTRE DE, Nelson's antagonist at Trafalgar, was born at Valensoles (Basses-Alpes), December 31, 1763, entered the navy in his fifteenth year, and passed as captain at thirty. Captain of division by 1796, he commanded the rear division at the battle of the Nile, and saved his own vessel, the *Guillaume Tell*, and four others. Vice-admiral in 1804, he next year took command of the Toulon squadron. At Cadiz he was joined by the Spanish fleet under Gravina, and, in order to keep the British fleet from the coasts of Europe, bore away westwards across the Atlantic, reaching the Antilles on 14th May. A month later he sailed back, still pursued by Nelson. At the Azores he fought an undecided battle with Sir Robert Calder, and, unable to reach Brest, again returned to Cadiz, where he was strictly blockaded by Nelson. This completely ruined Napoleon's scheme for the invasion of England, and Villeneuve, knowing that he was about to be superseded, determined to fight Nelson before his successor could arrive at Cadiz. On that memorable day of English glory Villeneuve's flag-ship, the *Bucentaure*, was dismasted and forced to strike. The admiral lay a prisoner in England till April 1806. On the journey to Paris he stopped at Rennes to learn how the emperor would receive him. On the morning of April 22 he was found dead in bed, with six knife-wounds in his heart. See NELSON.

Villeroi, FRANÇOIS DE NEUVILLE, DUC DE, French marshal, was born 7th April 1644, and educated at court with Louis XIV., but was banished to Lyons for a love-affair. In 1680 he returned to court, and in 1693 became a marshal, having distinguished himself at Neerwinden. As commander in the Netherlands in 1695–96 he showed great incapacity; and sent in chief command to Italy in 1701, he was there defeated and taken prisoner by Prince Eugene. Again he commanded in the Netherlands, but was defeated by Marlborough at Ramillies. Madame de Maintenon got him made guardian to Louis XV. Orleans sent him to live on his estate in 1722, because of his intrigues; but he was subsequently governor of Lyons, and died at Paris, 18th July 1730.

Villiers. See BUCKINGHAM (DUKE OF).

Villiers, CHARLES PELHAM, corn and poor-law reformer, was born January 19, 1802, a younger brother of the fourth Earl of Clarendon (q.v.). He was educated at Haileybury and St John's College, Cambridge, and was called to the bar at Lincoln's Inn in 1827. He was returned for Wolverhampton as a Free Trader in 1835, and sat its constant and consistent member for about sixty years, being again returned unopposed as a Liberal Unionist in 1892. He made his first motion in favour of Free Trade in 1838, and thereafter year by year till triumph was won. Chairman of the Select Committee on Public Houses, he sat with cabinet rank as President of the Poor-law Board (1859–66). The Union Chargeability Act (1865)

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is but one of the many measures of reform due to his powerful advocacy. His jubilee as member for Wolverhampton was celebrated in 1885, and even the honours of the dead were paid to him there still living—a marble statue was unveiled by Earl Granville in 1879.

Villon, FRANÇOIS, or the poet known by that name, was born, it would seem, in or near Paris in 1431. From himself we learn that in gratitude he adopted the name of his 'more than father,' Maistre Guillaume Villon; his own, as M. Longnon has established, was François de Montcorbier. Of his life we may say with M. Jannet that, 'though we know little more than he tells us himself, we know only too much.' We know nothing of it before 1455 or after 1461, and the dismal story of the interval derives what coherence it has from the researches of M. Vitu and M. Longnon. In 1455 he was a needy master of arts of, apparently, blameless life; but having the ill-luck to kill a priest in a street squabble, he took to flight, lay for some months in hiding, and was sentenced to banishment. The sentence was eventually rescinded on proof that he had been savagely attacked and forced to defend his life; but the affair no doubt influenced his career. Distress may have driven him into partnership with scoundrels, or he may have found that justifiable clericide had disposed of his prospects with the Sorbonne. He was also in trouble with a love-affair, and in his *Petit Testament* he talks of going to Angers to escape from a hopeless passion. This was in 1456, and in the next year it came out, through the confession of a friend of his, Guy de Tabarie, that he was one of a gang of burglars who, among other feats, had broken into the Collége de Navarre and stolen 500 crowns, and that he was then at Angers planning another operation of the same sort. Brought under the notice of the police, he was in course of time caught, put to the question, and with five others sentenced to be hanged. It was on this occasion that he wrote the grim ballade-epitaph on himself and his comrades swinging in the wind and feasting the crows on the gibbet, and the no less famous quatrain misquoted by Rabelais. He appealed, however, and by some friend's interest the sentence was commuted to banishment from the kingdom. He found an asylum under the Duc de Bourbon at Roussillon in Dauphiné; but early in 1461 he was back again at his old game, and passed the whole summer in a cell, or rather pit, in the prison of the Bishop of Orleans at Meung-sur-Loire. What his crime was is uncertain; tradition says sacrilege, but M. Longnon suspects it was a burglary at Montpipeau. This time he owed his life to Louis XI., who passed through Meung, October 2d, and ordered a gaol-delivery in honour of his accession. Here Villon passes from our sight. Rabelais has a story of his 'vieux jours,' but before the century was out he had evidently become one of those legendary characters to whom stray stories are affiliated, as is shown by the *Repeues franches*, and by the other story told by Rabelais, which is at least two centuries older than Villon. That he survived his release many years is most unlikely. He speaks of himself as a dying man, and it is clear from his own words that he was a wreck, shattered by debauchery, prison-life, and torture, and from one passage it would seem far gone in consumption. Nor is it likely that the writer of the *Grand Testament* would have left no trace of his existence.

Villon's works consist of the *Petit Testament*, written at Christmas in 1456, the *Grand Testament*, begun, and perhaps finished, soon after his release in October 1461, and some forty or fifty short pieces, chiefly ballades, many of which are imbedded in the *Grand Testament*. Of the *Jargon* ballades some, the second for instance, are clearly his, but his claim to the whole is doubtful. Readers of Villon generally pass through three stages of feeling with regard to him. The first introduction is usually through selected specimens, like 'The Ladies of bygone Days,' his mother's 'Prayer to our Lady,' the 'Epistle to his Friends,' and fascination is the inevitable consequence. Unrestricted acquaintance is almost sure to lead to disgust with his revolting realism and the atmosphere of rascality one is forced to breathe in his company. This is the feeling which finds eloquent expression in Mr R. L. Stevenson's striking essay, but, as he himself admits in his preface, it is one that may be modified afterwards. Not that anybody will make a serious attempt to clear Villon: poor François is beyond the help of paradox or whitewash; but there is still room for pity. The undercurrent of profound sadness that runs through all his seeming recklessness does not make itself fully felt at the first or second reading, nor yet the pathos that lies in the glimpses he gives of a sense of his own degradation. The repulsion is perhaps as strong as ever—'but yet the pity of it!' Some there are, indeed, who are not repelled but rather attracted by the infamy of Villon's life; for there is an eccentric school of thought that, in its blind hatred of all that it dubs as the conventional and the respectable, is ready to accept even crime as a mark of genius. Others, again, maintain that Villon the poet was born of Villon the burglar and blackguard, though it is not clear upon what grounds they rest their assertion that if he had not been a gaol-bird he would have been songless. This much, however, may be said for him, that at the worst he was a better and an honester man than the vapouring scoundrels, apt pupils of Victor Hugo's philosophy, who pose as victims of a corrupt social system and make society responsible for their own vicious propensities. Villon was no *poseur*. He had the manliness to acknowledge that the miserable bed he lay upon was of his own making.

The first dated edition of Villon's poems is of Paris, 1489; but the earliest is possibly an undated one. By 1542 twenty-seven editions had been printed. That of 1533 was edited by Clement Marot. His poetry did not suit the taste of the 17th century, but in the 18th there was a reaction. The best modern editions are those of Paul Lacroix, 'Bibliophile Jacob' (1854–66–77), Pierre Jannet (1867–73–77–81–84), Louis Moland (1879), Auguste Longnon (1892). A very faithful English translation by Mr John Payne was printed by the Villon Society in 1878, and an expurgated edition of the same published 1881. See also A. C. S. Vitu, *Notice sur François Villon d'apres des Documents nouveaux* (1873); A. Longnon, *Étude biographique sur François Villon* (1877); W. Bijvanck, *Specimen d'un Essai sur les Œuvres de François Villon* (1882); A. Vitu, *Le Jargon du XV^e^ Siècle* (1884).

Vilno, capital of a government in the west of Russia, stands on the Vilia, 430 miles SW. of St Petersburg by rail, with a trade in timber and corn; pop. (1888) 102,845, mainly Poles, but with many Jews. The city was the chief town of the Lithuanians and the capital of their grand-duke. The government has an area (10,421 sq. m.) larger than Switzerland. Pop. 1,304,738.

Vimeiro, also spelt Vimieiro and Vimiera, a town of 1800 inhabitants in the Portuguese province of Estremadura, 30 miles N. of Lisbon. Here Wellington defeated Junot, 21st August 1808.

Vinaroz, a small port of Spain, 45 miles NE. of Castellon by rail; pop. 9851.

Vinca. See PERIWINKLE.

Vincennes, an eastern suburb of Paris, just outside the fortifications, whose park, the Bois de Vincennes, is the pleasure-ground of eastern Paris.

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The ancient castle founded in the 14th century by Philip VI. was long a residence of the kings, then became a state-prison, and in 1834 was made a fort of the inner line of fortifications, and extended and strengthened. In its moat the Duc d'Enghien was shot. In the Bois are exercise grounds for infantry and artillery. There are in Vincennes barracks, hospitals, and a good deal of varied manufacturing industry.

Vincennes, capital of Knox county, Indiana, on the navigable Wabash, 52 miles by rail N. of Evansville. It contains a Roman Catholic cathedral, steam flour-mills, &c., and is the oldest town in the state, being settled by the French in 1735. From 1800 to 1813 it was the capital of the Northwest Territory. Pop. (1890) 8853.

Vincent, ST, deacon and martyr, born at Hulsea in Spain, was under Diocletian's persecution imprisoned and tortured at Valencia, dying in 304. His day is the 22d January.—For the island, see ST VINCENT.

Vincent de Beauvais. See ENCYCLOPÆDIA, Vol. IV. p. 335.

Vincent de Paul, one of the most eminent saints of the modern Catholic Church, was born of humble parentage at Pouy near Dax in Gascony, 24th April 1576. He studied at Toulouse, and was admitted to priest's orders in 1600. On a voyage which he was making from Marseilles to Narbonne his ship was captured by corsairs, and he with his companions sold into slavery at Tunis. His master, a renegade Savoyard, yielded to the exhortations of Vincent, and resolved to return to the Christian faith, so, escaping from Barbary, they landed in France in 1607. Having gone thence to Rome, he was entrusted with a mission to the French court in 1608, and became almoner of Henry IV.'s queen, Marguerite de Valois. As pastor of Clichy and of Chatillon, he formed associations for helping the sick, visited prisons and galleys, and in 1619 was appointed almoner-general of the galleys. The tale is told, but lacks authority, that in 1622 he took the place and wore the fetters of a galley-slave, whose heart he had failed to reach otherwise. Meanwhile he had laid the foundation of what eventually grew into the great and influential congregation of Priests of the Missions, an association of priests who assist the parochial clergy by preaching and hearing confessions periodically. The rules of this congregation were finally approved by Urban VIII. in 1632; and in the following year the Fathers established themselves in the so-called Priory of St Lazare, in Paris, whence their name of *Lazarists* is derived. From this date his life was devoted to the organisation of works of charity and benevolence. To him Paris owes the establishment of the Foundling Hospital. The noble Sisterhood of Charity (see SISTERHOODS) was of his founding, and Vincent was entrusted by St Francis of Sales with the direction of the newly-founded order of Sisters of the Visitation. He died at the age of eighty-five, at St Lazare, September 27, 1660, and was canonised by Clement XII. in 1737. His festival is held on the 19th July.

There are lives in English by C. A. Jones (1873) and R. F. Wilson (1873), and in French by Maynard (3d ed. 1886), Chantelauze (1882), Bongaud (1889), &c.

The Society of Vincent de Paul was founded at Paris in 1833 by eight young men, of whom Ozanam (q.v.) was one, for the purpose of helping the poor, and chose St Vincent de Paul as patron. The society, which has branches in all parts of the Catholic world, devotes itself to relieving the poor, founding and managing libraries for their use, establishing crêches for children and dispensaries, visiting prisoners, and finding employment for men out of work. Occasionally sums of money are raised by the society to relieve distress in cases of famine, &c.

Vincentius Lerinensis. See LÉRINS.

Vinci. See LEONARDO DA VINCI.

Vindhya Mountains. See INDIA, p. 99.

Vine, the Vitis of the botanist, is a genus of which there are a number of species; they are found over a wide range of the northern hemisphere, the majority in temperate Asia, as well as in North America, but none are found in Europe. The genus belongs to the Vitæa section of the order Vitaceæ (q.v.). It has pentamerous flowers (five-toothed, five petals, and five stamens); the petals are attached to the discs at the base of the ovary, but,

Vine (*Vitis vinifera*).

contrary to general rule, they adhere at the top and form a cap, which is thrown off by the stamens as they elongate and expand; the latter adhere for a time to the base of the fruit. All the species are furnished with claspers by which to lay hold for their support on any object within their reach. Some have leaves greatly lobed, others have them nearly plain.

The *Vitis vinifera*, the European wine-yielding grape-vine, is that which has greatest economic and commercial importance. It is found on the shores of the Caspian Sea, and it grows wild throughout the lower Caucasus and in Armenia. The cultivation of this plant has occupied much of man's time and attention in all nations that have attained to any degree of civilisation, from the very dawn of history, and it is spreading more rapidly at the present time than ever it did at any previous one. The endless variety of grape-vines in cultivation seems to indicate that the *Vitis vinifera* is not a true species, and this view is confirmed by the circumstance that seed taken from any variety of grape does not reproduce the parent, as it should do if it were an unbroken species, but one widely different, and as a rule very inferior to the parent, except in exceedingly rare instances, when a step in advance may take place. The writer has raised hundreds of vines from seeds taken from the finest grapes in cultivation, the rare exception being a variety equal or superior to the parent, and the rule being a reversion to a very inferior type; it is questionable if any of our high-class grapes are to be found in an uncultivated state in any part of the world. The plant has evidently been developed by the ingenuity of man at some very remote date, of which there is no record, just as our apples, plums,

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pears, peaches, and many other fruits and vegetables have been; and if man's constant care were withdrawn from their cultivation they would soon disappear from the earth, leaving it in possession of their wild progenitors.

By many Persia is thought to be the home of the grape-vine, and excellent wine is still made there and exported. In European graves of the Bronze Age (q.v.) grape stones have been found, and in Greece and Italy the culture is primeval. The culture of wine on a commercial scale is dealt with in the article WINE and in the articles on the wine-growing countries—Italy, France, Hungary, Germany, the Madeira and Canary Islands, and in later times Cape Colony, Victoria, South Australia, and the United States, especially California. In Europe now the line of open-air culture of the vine on a large scale passes from the country just north of the Loire in France through Belgium, central Germany, and Silesia; but in the middle ages wine was largely produced north of this—in North France, Holland, and in England—either because the climate was warmer, or because consumers were content with poorer wine.

The cultivation of the grape-vine was introduced into England by the Romans. At the date of the Norman Conquest there is evidence that the vine was pretty extensively cultivated in the south and south-west of England for the production of wine until about the middle of the 18th century, when for this purpose its cultivation was given up, and it was grown for dessert purposes against walls and dwelling-houses with considerable success, and continues to be so grown up to this date. For this mode of cultivation the Royal Muscadine, Sweetwater, and Black Hamburgh are amongst the most suitable. All the finer sorts of grapes, such as Frontignans, Muscats, Gros Colman, and many others of the higher classes of grapes, can only be cultivated in Britain in hothouses, and at the present date enormous quantities are so cultivated in Britain and the Channel Islands, some growers sending from 50 to 100 tons to market annually. This great supply has depressed the price of grapes by more than one-half since 1882, very much to the public benefit, for it is now recognised that for man, whether in health or sickness, there is no more wholesome or grateful food than good grapes, acting as they do favourably on every organ of the body. An attempt has been made by the Marquis of Bute to establish what may be called an open field vineyard on his Cardiff Castle estate in Wales, for the production of wine. The vineyard was planted in 1875, and 40 gallons of wine were made in 1877 and more in 1878. But in the cold wet summer of 1879 the crop was a failure, as also in 1880 on account of the wood not being ripened the year before. In 1881 the wine was of the best quality, like a first-class still champagne, and was all sold at 60 shillings a dozen: 1882 and 1883 were complete failures; but since 1884 more or less wine has been made every year.

The soil most suitable for the cultivation of the grape-vine as it is grown in Britain is what may be called a good wheat soil, calcareous in its nature, a sort of compromise between a clay and a light soil. Turf taken from land of this description, not more than 4 inches deep, and stacked in narrow ridges for a winter so as to get the full action of frost on it, may be chopped down in the spring, and if it is on the side of being heavy—i.e. if clay is in excess—it should have burned clay or old lime rubbish mixed with it in the proportion of 1 to 10. The best manure for a vine border is one into which finely-ground bones, horn shavings, and other phosphatic manures enter, not forgetting potash. It is well to avoid stable manure, as that very frequently breeds fungi. On the other hand, cow manure sours the soil, and should also be avoided.

The writer, while investigating the system of vine-culture on the banks of the Rhine, found that growers there confined the cultivation to soil nearly all made up of the scoriæ and debris of the rocks, and avoided soil which in England was found most suitable; but the explanation was that, while the soils in question would grow grapes well, they did not yield wine of the desired bouquet.

The vine is easily propagated in a variety of ways—by layers, by cuttings, by eyes; also by budding, inarching and grafting, as well as by raising from seed. The common method of establishing vineyards for open-air cultivation in grape-growing lands—as in California—is to trench the soil where the land is hard, and to plant young canes at distances of from 3 to 4 feet apart, and 4 to 5 feet between rows, placing a stake to each young vine for its support. In the second year fruit can be produced, though it is better for the ultimate success of the vineyard not to crop till the third. Another method—more laborious and costly, and showing in greater ultimate advantage—is to put the vine cuttings in 'nursery rows,' to let them form roots there (as with gooseberry cuttings), and then transplant. Much of the labour required for growing grapes either in the open or under glass is devoted to pruning and training the plants. Various systems of pruning are in use, for securing greater vigour in the plant, to obtain more and better fruit, to keep up a constant supply of fruit-bearing wood, and to maintain the fruit-bearing portion, not on the extreme branches only, but near the ground. Nothing can well be less like the great vines grown under glass than the ordinary vine of a French or German vineyard, the vines being kept to some 3 or 4 feet in height, so that the uninitiated thinks rather of a raspberry garden than of a vineyard. In Italy greater luxuriance is allowed, and vines are even trained on trees pruned for the purpose.

The vine is very fruitful, and would soon exhaust itself by over-production; hence the clusters have to be carefully thinned. The extent to which thinning is necessary depends on the strength and size of the plant. The berries on the clusters also usually require thinning, according to circumstances; thus a cluster of Black Hamburgh with 120 berries may with advantage be reduced to half the number. The vines most suitable for cultivation under glass for early forcing, so as to give ripe grapes in June, are the Black Hamburgh, Buckland's Sweetwater, Foster's White Seedling, and Royal Muscadine. Those who desire to have grapes of the very highest flavour should plant the Frontignans—black, white, or grizzly, the Muscat of Alexandria, Black Muscat, and Duke of Buccleuch. For a late house to yield grapes all winter and into the spring, the following sorts may be planted: Black Alicante, Gros Colman, Lady Downes, and Mrs Pince.

Of vine diseases, some are caused by insects, beetles, weevils, caterpillars and larvæ of various kinds; of these the most destructive is the Phylloxera (q.v.); of various fungoid diseases, Oïdium has been most harmful.

The great Hampton Court vine, planted in 1769, fills a house 66 feet long by 30 wide, and bears annually as many as 1700 small bunches (Black Hamburgh). Nearly twice the size is the vine at Cumberland Lodge, Windsor Park, which produces a crop of 2000 bunches, averaging three-quarters of a lb. each. The Breadalbane vine in Perthshire covers a house 172 feet long by 25 broad.

At the international exhibition of the Royal Caledonian Horticultural Society in 1875 a single bunch of the Raisin de Calabria was shown, weighing 26 lb. 4 oz.; and at the same exhibition was

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shown a cluster of White Nice only a few ounces lighter. These are coarse varieties of grapes, it is true; but at the Belfast Exhibition in 1874 a bunch of the Black Hamburgh was shown which weighed 21 lb. 12 oz., and this is a grape of high quality.

In the United States, especially California, the development of viticulture has been great and rapid. Early attempts were made to grow foreign grapes in the open air, but none of these met with success east of the Rocky Mountains. Till the Californian grape industry developed, the growing of foreign grapes in the United States was under glass, and for dessert purposes. Four native American vines (of some ten found wild) are used for wine-making, the most important being *V. Lambrusca*. In 1890 there were 400,000 acres under vines, three-fourths of which were producing wine, and the total produce was about 40,000,000 gallons. In California alone the acreage of vines was 150,000 acres, seven-eighths of which were devoted to wine. American vine-stocks, as being less liable to suffer from the phylloxera, have with advantage been introduced into France for grafting on. On the Murray River, in Australia, a vast extent of land is being irrigated and planted with vines, the fruit of which is being converted into raisins and wine. See VICTORIA, SOUTH AUSTRALIA.

See D. Thomson, *Fruit Culture under Glass* (2d ed. 1881); Barron, *Vines and Vine Culture* (new ed. 1887); and the present writer's *Practical Treatise on the Grape Vine* (1862; 10th ed. 1890). There are American works by Haraszthy (1863), Hyatt (1867), and Husmann (1880), and innumerable works in French, German, and Italian. See also WINE, and books there cited.

Vinegar is that form of Acetic Acid (q.v.) which is generally preferred for culinary purposes, and which is made by the fermentation of vegetable substances. In Great Britain it is manufactured on a large scale by the fermentation of malt; on the continent of Europe it is as largely made from low wines which have turned sour. Malt vinegar, or British, as it is sometimes called, is made by brewing a weak wort from malt exactly as for Beer (q.v.). To 100 gallons of this, at a temperature of 70° F., are added 4 gallons of yeast, and well stirred through for eight or ten minutes. This mixture is allowed to ferment actively for two days, and is then transferred to the stoving-room; here it is distributed into a number of tubs, which when filled are covered over with coarse canvas. This room is dark, and is heated by stoves, and the heat is constantly sustained for weeks until the conversion of the wort into vinegar is complete. The process of acetification is accelerated by introducing into the casks with the wort either the residuary fruit used in making domestic wine or the foot-stalks and skins of grapes. This *rape*, as it is called, acts as a kind of ferment. Various other processes are used by different manufacturers for the purpose of producing it quicker. Much vinegar is also made of beer which has become sour; it is, however, very inferior in quality. Vinegar prepared by these methods contains a large amount of foreign matters, which can be got rid of by simple distillation; the acid liquid which comes over constituting what is known in pharmacy as *distilled vinegar*. What is sold commercially as distilled vinegar is simply acetic acid distilled from wood (see PYROLIGNEOUS ACID), and diluted with five times its volume of water. This constitutes also the vinegar used by pickle manufacturers; it is quite as wholesome as common vinegar, but wants its agreeable flavour; its preservative powers are, however, much greater, and its price very much less. The addition of ammonia serves to distinguish French from English vinegar: with the former the colour is purplish; with the latter there is either no change or it is brownish.

As a condiment vinegar is an ingredient of a large number of sauces, and of ketchups and pickles; and although it cannot be regarded as an essential article of food, its applications in cookery are numberless. Young ladies with an undue tendency to corpulency are said sometimes to drink vinegar freely with the view of improving the figure; but, as vinegar only causes thinness by injuring the digestion, it is obviously not worth while to run the risk of exchanging slight fullness of habit for chronic dyspepsia.

Aromatic Vinegar consists of strong acetic acid, holding in solution camphor and the oils of cloves, lavender, rosemary, and lemons. It is very fragrant and volatile, and must be kept in well-stoppered bottles. It was formerly regarded as a valuable prophylactic of all infectious diseases, but is now only used as an external stimulant, the vapour being applied by a smelling-bottle to the nostrils in cases of fainting. See *Acetic Acid and Vinegar* (Technological Manuals, 1885), and W. T. Braunt's *Manufacture of Vinegar* (1889).

Vinegar-eels. See EEL.

Vinegar Hill (389 feet high), close to the town of Enniscorthy, in County Wexford, scene of the complete defeat of the Irish rebels by General Lake, June 21, 1798. They had held their camp here for about a month, and disgraced their cause by ruffianly outrages on the lives and property of the loyalists in the surrounding country. About 400 of the rebels were cut down, the remainder fled in headlong rout to Wexford, whither Lake marched the day after, killing all whom he found with arms. See Lecky's *History of England in the Eighteenth Century*.

Vinegar-plant (*Penicillium glaucum*), a fungus of the sub-order Hyphomycetes, but somewhat resembling those known by the name of Mould (q.v.). It forms a flocculent mass or web, which is tough and crust-like or leathery, and when examined by the microscope is seen to consist of a *mycelium* of branched threads, with the branches somewhat tangled, and the spores disposed in patches about the pencil-shaped ends of fertile threads. It is found on decaying bodies and in fluids undergoing the acetous fermentation, which it greatly promotes, and indeed readily occasions, a small piece placed in sugar and water soon changing it into vinegar. Advantage is sometimes taken of this property for making vinegar.

Vinet, ALEXANDRE RODOLPHE, Swiss divine and critic, was born at Ouchy near Lausanne, June 17, 1797, studied there, was appointed at twenty to the chair of French Language and Literature in the gymnasium of Basel, in 1835 in the university itself. He had been ordained in 1819, and in 1837 he accepted the chair of Practical Theology at Lausanne. His attitude to the question of the relation between church and state was shown already in his prize essay for the Paris Société de la Morale Chrétienne, *Mémoire en Faveur de la Liberté des Cultes* (1826), and he soon found himself involved in the struggle against state interference. He withdrew from the Vaud canton association of clergy (1840), but after the democratic attack of 1845 upon the 'fanatics' without, and the Evangelicals within, the state church, resigned his chair, and at the close of the year joined the newly-formed Free Church of Vaud. Meantime he had been appointed professor of French Literature in the Lausanne Academy, but this office he was compelled to resign in 1846. He died at Clarens, 4th May 1847. Vinet was an eloquent and earnest preacher, clear and brilliant, evangelical and orthodox, yet an advocate of

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the utmost liberty and toleration of opinion and practice in matters of religion, with separation from the state. He possessed fine critical insight and a profound knowledge of French literature, and his *Chrestomathie Française* (1829), his study of Pascal (1848), his *Études* on the literature of the 19th century (3 vols. 1849–51), his *Histoire* of 18th-century literature (2 vols. 1853), the *Moralistes des XVI. et XVII. Siècles* (1859), and his *Poètes du Siècle de Louis XIV.* (1862) take rank with the best contemporary work of their kind. It was at his initiative that Sainte-Beuve came to Lausanne to deliver his famous lectures on Port-Royal. In ethics Vinet owned Pascal and Kant as his masters.

The chief of his books that have been translated into English are *Christian Philosophy* (1846), *Vital Christianity* (1846), *Gospel Studies* (1851), *Pastoral Theology* (1852), *Homiletics* (1853), *Studies in Pascal* (1859), *Outlines of Philosophy and Literature* (1865). See the studies by E. Scherer (1853), Chavannes (Leyden, 1883), the Lives by E. Rambert (1875), Louis Molines (1890), and Laura M. Lane (in English, 1890), and his Letters, edited by C. Secretan and E. Rambert (2 vols. 1882), and by E. de Pressensé (1890).

Vingt-et-Un, a game of cards, the aim in which is to get as near as possible to the value of twenty-one (hence the name) without exceeding it. The game is played with the whole pack, the ordinary cards being reckoned according to the number of pips on them, while the court-cards are ten, and the ace is one or eleven, as the holder may elect.

Vinland ('Wineland'), the name given to the chief settlement of the early Norsemen in North America. It is undoubtedly represented in modern times by part of Massachusetts and Rhode Island. The first that saw it was Bjarne Herjulfson, who was driven thither by a storm in the summer of 986 A.D., when making a voyage from Iceland to Greenland, of which country his father, Herjulf, and Eric the Red were the earliest colonists. But Bjarne did not touch the land, which was first visited by Leif the Lucky, a son of Eric the Red, about 1000 A.D. One part of the country he named Helluland ('Stoneland'); another Markland ('Woodland'), the modern Newfoundland and Nova Scotia; a German in his company having found the grape (most probably the *Vitis vulpina*) growing wild, as in his native country, Leif called the region Vinland. The natives from their dwarfish size they called *skraelings*. Two years after Leif's brother, Thorwald, arrived, and in the summer of 1003 led an expedition along the coast of New England southwards, but was killed the year following in an encounter with the natives. The most famous of the Norse explorers, however, was Thorfinn Karlsefne, an Icelander, who had married Gudrid, widow of Thorstein, a son of Eric the Red, and who in 1007 sailed from Greenland to Vinland with a crew of 160 men, where he remained for three years, and then returned, after which no further attempts at colonisation were made. Rafn, in his *Antiquitates Americanæ* (Copenh. 1837), published the first full collection of the evidence which proves the pre-Columbian colonisation of America. Both he and Finn Magnusen labour to show that Columbus derived his first hints of a new world from the accounts of these old Icelandic expeditions. Finn Magnusen is believed to have established the fact that Columbus did visit Iceland in 1477, fifteen years before he undertook his expedition across the Atlantic, and so may have heard something of the long-abandoned Vinland.

See also Wilhelmi's *Island, Hvitramannaland, Grönland, und Vinland* (Heidelberg, 1842); *The Finding of Wineland the Good*, by Arthur Middleton Reeves (1890); and *America not Discovered by Columbus*, by Professor R. B. Anderson (Chicago, 1891).

Vinnitza, a Russian town, in Podolia, stands on the Bug, 120 miles SW. of Kieff; pop. 18,733.

Viol (Ital. *viola*; Late Lat. *vitula*, from *vitulari*, 'to celebrate a festival:' *fiddle* is a doublet), a musical instrument played with a bow, which was the immediate precursor of the violin. It is to be seen represented on monuments as far back as the close of the 11th century. The back was flat; there were larger bends in the sides than in the violin; and frets, like those of the guitar, were placed on the neck of the instrument, to show where the fingers of the left hand should be put to produce the desired notes. There was great variety in the number of strings: in Germany three, four, and five were all common; in Italy there were usually six. The strings were tuned by fourths and thirds. There were four sizes of viol in use, *treble* or *discant*, *tenor* or *viola da braccio*, *bass* or *viol da gamba*, and *double bass* or *violone*, and they were often played together in concerted music. Their tone was rather penetrating than powerful. The treble viol was rather larger than the modern violin. The viol da gamba held its place longer than the smaller viols, but was superseded by the violoncello. The *viol d'amore* was a tenor viol, with from seven to fourteen sympathetic metal strings, stretched under the fingerboard, tuned to a scale. A 'chest of viols,' consisting of six instruments of various sizes, was in the 16th and 17th centuries to be found in most houses of any pretension in England. See BASS, DOUBLE BASS.

Viola, also called ALTO VIOLA, or TENOR VIOLIN, a larger description of violin, to which the part between the second violin and bass is generally assigned. It has four gut strings, the two lower covered with silvered copper wire. It is tuned in fifths, the first or upper string sounding A on the second space of the treble clef, and the others the D, G, and C successively below. The compass is from the latter note to about C on the second leger-line above the treble clef; and the music is generally written on the alto clef, or on the G clef if high.

Violaceæ, a natural order of exogenous plants, of which from 200 to 300 species are known, natives both of temperate and tropical countries, those belonging to the former being generally herbaceous, and those belonging to the latter generally shrubby. They have simple leaves with persistent stipules. The calyx consists of five persistent sepals, usually elongated at the base; the corolla of five hypogynous petals, unequal in the sub-order Violeæ, and equal in the sub-order Alsodeæ. There are five stamens inserted in a hypogynous disc, the filaments prolonged beyond the anthers. The ovary is one-celled, generally with many ovules, the style single, with an oblique stigma. The fruit is a three-valved capsule, with many seeds. The best-known species are the violets. Emetic and purgative properties prevail in the order, and some of the South American species yield valuable medicines; see IPECACUANHA. Yet the leaves of the Lobolobo (*Conohoria* or *Alsodeia lobolobo*) are used in Brazil as spinach.

Violet (*Viola*), a genus of herbaceous plants, mostly perennial, of the natural order Violaceæ. They have a short stem, or are stemless, having in the latter case a short root-stock (rhizome); the leaves are alternate, and have long stalks; the flowers have five petals, different in form and size, the lowest having a spur behind. About 100 species have been described, natives chiefly of northern temperate countries. Several species are much cultivated in gardens, some, as *V. tricolor*, on account of their beautiful flowers; others, as *V. odorata*, on account of their fragrance. *V. tricolor*,

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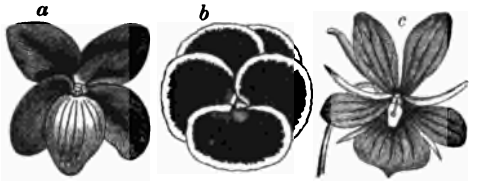
the Pansy, Pansy Violet, or Heart's Ease, is very abundant in fields, meadows, woods, &c. in Britain and in most parts of Europe, and the north of Asia; it is also found in North America, although it has probably been introduced there from the Old World. It is a very variable plant, its flowers differing much in size and colour, but is readily distinguished by its large lyrato-pinnatifid stipules. The stem is somewhat triangular, branching, and diffused. In



Flowers of *a*, Sweet Violet (*Viola odorata*); *b*, Fancy Pansy (*V. tricolor*); and *c*, Bedding Viola (*V. cornuta*).

some of its most common forms this plant is a mere despised weed, with small flowers; other wild forms have much larger flowers; and to it are referred the large and beautiful garden pansies, the varieties of which are innumerable. The Pansy (Fr. *pensée*, probably from the drooping attitude of the flower, suggestive of thoughtfulness) is one of the finest of florists' flowers (see Vol. IV. p. 694), and no flower has been more improved by cultivation. There are two classes or types of pansy, the Show Pansy, in which the colours are either white, yellow, or purple, alone or in combination, and the Fancy, in which crimson or maroon is added to the other colours and the flowers are beautifully blotched or shaded, having a clear margin of the ground colour surrounding them, as shown in No. 2 of the illustration. No. 3 shows one of the original parents of the popular Bedding Violas, the varieties of which are very numerous. By intercrossing with the pansy and other showy species greater variety and brightness of colour prevails now than formerly when purple was the principal tint. Another species has of late years been introduced into cultivation, *V. altaica*, a native of Siberia, and by itself, or by hybridisation with *V. tricolor*, has become the parent of many garden pansies. The finest garden pansies are not preserved or propagated without great difficulty, and require most careful cultivation, without which they quickly relapse to their wild forms. Florists demand that a pansy shall have a round, flat, and very smooth edge, the petals thick and velvety, the three front petals alike in their ground colour, the lines or pencillings in the centre bright and distinct, the two back petals—which always differ in colour from the others—perfectly uniform, the flower measuring at least an inch and a half across. The Sweet-scented Violet (*V. odorata*) is common in grassy places in England and throughout Europe and the north of Asia. The flowers are either of a deep blue colour or more rarely white. Several other species, with pale blue flowers, and destitute of smell, are common in meadows and woody glades in Britain and other parts of Europe. The Dog Violet (*V. canina*) is one of the most common ornaments of hedgebanks. North America has a number of species, one of which, *V. blanda*, is sweet scented. The Himalayas produce a number of species very similar to those of Europe. The roots of several species of violets were formerly used in medicine. They contain a bitter alkaloid, *Violine*, which acts as an emetic and purgative. The petals of the sweet-scented violets are used for the preparation of *Juice* or *Syrup of Violets*, which is used as a gentle purgative for children, and also as a chemical test, being reddened by acids, and rendered green by alkalies. The Dog-tooth Violet (q.v.; *Erythronium dens-canis*) has no connection with this genus, but is a very beautiful flower of the natural order Liliaceæ. —The so-called Violet-powder, used for purposes of the toilet and nursery, is very fine starch perfumed with orris-root or other perfume.

Violet Stones, stones found upon certain mountains, as on the Brocken and the Riesengebirge, which, in consequence of being covered with Violet Moss, emit a smell like that of violets. Violet Moss (*Chroolepus Iolithus*) consists of simple articulated threads, and spreads over the stones in the form of a delicate incrustation.

Violin (diminutive from *viol*), the smallest but most important of the stringed musical instruments played with the bow. Like other bow-instruments now in use, it consists of a wooden sonorous chest, formed of two slightly arched surfaces, known as the back and belly, united by sides or ribs, and with a curve or hollow on each side in the middle of the length; a neck or finger-board attached to the chest; and strings, fastened at one end to the belly by a tailpiece or projection of wood, and at the other to turning-pins at the head or extremity of the neck, by which they can be tightened or loosened at pleasure. The strings thus passing over the belly are raised up from it by a bridge, which is supported in the interior by the sound-post; and on the belly there are two sound-holes opposite each other, of a form resembling the letter *f*, or rather the long *f*. The sounds are produced by drawing a bow across the strings, the upper surface of the bridge being convexly curved, so as to enable the bow to be drawn along each string separately, without coming in contact with the rest. The modern violin has four strings of gut, the lowest covered with fine silvered copper wire, or sometimes, in the best instruments, with silver or even gold wire. These strings are tuned in fifths, the highest or first string sounding E on the fourth space of the treble clef, and the other three the A, D, and G in succession below. The bow, made of horsehair, is held in the right hand, and the sounds of each string, other than the open notes, are obtained by stopping—i.e. pressing it with the finger against the fingerboard at certain distances, thus shortening the vibrating portion, and raising the pitch of the sound. Very high notes are produced by the Harmonics (q.v.) of the string, which, instead of being pressed against the fingerboard, is touched lightly, the sound resulting from the vibration being not, as in ordinary cases, of the part of the string between the point of stopping and the bridge, but of a harmonic section of it. A peculiar modification of tone is produced by the application of the *mute*, or *sordino*, a little instrument placed on the bridge. A violin or other bow-instrument is occasionally played *pizzicato*—i.e. with the fingers, as a harp or guitar. The compass of the violin is about three octaves and a half, from G below the treble clef to C above the fifth leger-line above it, with all the intermediate chromatic intervals; but the highest notes are apt to be harsh and squeaking. Great players command a few notes higher, chiefly by harmonics. Though chiefly an instrument of melody, it is to a limited extent capable of harmony by double stops—two notes may be struck together, and three or four notes may be played in arpeggio. No instrument can compare with the violin in power of expression and execution. It has an unlimited command over a very wide range of sounds, to which any degree of piano and forte, of staccato and legato, can be imparted. In orchestral music there are always two different violin parts known as first and second violin (see ORCHESTRA); and the same is generally the case when the violin is

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used in concerted music, the usual arrangement of stringed quartett music being for two violins, viola, and violoncello.

The origin of the violin has been variously traced. The generally accepted view derives it from the one-stringed *Ravanastron*, the simplest of the numerous oriental stringed instruments played with a bow, which is traditionally the invention of Ravana, king of Ceylon, 5000 B.C., and is still played by Buddhist begging monks. From India these instruments of varied form found their way, through Persia, Arabia, and Spain, to the rest of Europe about the close of the 11th century. The French *Rebeck*, resembling the oriental *Rebab*, is the type of them, and from it sprang the Viol (q.v.), the immediate precursor of the violin. Another account derives the violin from the classic lyre, as well as the *Crwth* of the Welsh, which was latterly played with a bow. It is not impossible that both theories may be correct. The bow has not been conclusively accounted for, being variously supposed to have been primarily a military bow, a plectrum, and a second monochord lute applied to the first. The earliest violins seem to have been those of Gasparo di Salò in Lombardy (1560–1610), one of whose violins at one time belonged to Ole Bull. Those of Maggini, probably his pupil, are still highly prized. During the 17th century the family of the Amati (q.v.) at Cremona, including Andrew, his sons Jerome and Antonio, and Nicolo, son to Jerome, produced violins the wonder of succeeding times, whose tone and quality more recent makers have in vain sought to equal. Antonio Stradivari (1649–1737), also of Cremona, pupil of Nicolo, if possible surpassed the Amati, and for a time the repute of Cremona was kept up by the families of the Guarnieri and Ruggieri. Next to the Cremonese violins, in the estimation of connoisseurs, stand those of the Tyrolese makers, Jakob Stainer (1621–83), and Matthias Klotz and his sons. Villaume of Paris is the most celebrated modern maker. Experience has shown that the minutest details of form and proportion, and the material of which each separate part is made, are matters of vital importance to the quality of the violin. The great makers seem by a succession of delicate experiments and observations to have attained to acoustical qualities of high perfection, which their careful workmanship and extreme dexterity enabled them in all cases unfailingly to reproduce. The prices of the best violins of Stradivari and Guarnieri del Gesù range from £200 to £500, but several have exceeded the latter figure; one was sold at Stuttgart a few years since at the fancy price of £2050. The cost of the raw materials of a violin, comprising seventy different parts, has been estimated at about 4s. 6d.

Two great schools of violin-playing originated in Italy—that of Corelli (q.v., 1653–1713), to which belong by direct tradition Joachim and Sarasate, and that of Tartini (q.v., 1692–1770). Among other players of note of different schools may be mentioned Lully (1633–87), Paganini (1784–1840), Spohr (1784–1859), August Wilhelmj (born 1845), Laub (1832–75), Ole Bull (1810–80), Henri Wieniawski (1835–80), and Mme. Normann Neruda (Lady Hallé, born 1840).

The violin has a whole literature of its own, of which a bibliography was compiled in 1892 by Mr E. Heron-Allen. See his *Violin-making* (1885), C. Engel's *Researches into the Early History of the Violin Family* (1883), G. Hart, *The Violin: its famous Makers and their Imitators* (1873; new ed. 1887), G. Dubourg, *The Violin* (1878), J. Broadhouse, *The Violin: its Construction practically considered* (1892), Dr Phipson's *Biographies of Eminent Violinists* (1877), the foreign works of Ruhlmann and Fétis, and Mr E. G. Payne's articles in Grove's *Dictionary* and in the *Encyclopædia Britannica*.

Viollet-le-Duc, EUGÈNE, architect, was born in Paris, 24th January 1814, and studied with especial care the ancient monuments of Provence, Italy, and Greece. In 1814 he was director of the restoration of the Sainte Chapelle, and from this time on was the great 'restorer' of ancient buildings in France, both secular and ecclesiastical; displaying unquestioned zeal and learning, but, from the point of view of those who suspect wholesale 'restorations,' a lack of piety for the actually old. He served as an engineer in the defence of Paris, and was a prominent advanced republican politician till his death, 17th September 1879.

Of his numerous works the best known was his great dictionary of French Architecture (1853–69). There have been translated into English works on military architecture, how to build a house, the annals of a fortress, the habitations of man in all ages, on restoration, and a volume on Mont Blanc. See monographs by Sauvageot (1880) and Saint-Paul (1881).

Violoncello (diminutive from Ital. *violone*, 'large viol or double bass'), a large instrument of the violin class, held by the performer between his knees. It has four gut strings, the two lower of them covered with silvered copper wire, and is tuned in fifths, the first or upper string sounding A on the fifth line of the bass clef, and the others the D, G, and C successively below. Its compass is from the latter note up to A on the second space of the treble clef, but soloists play an octave higher. Its signature is usually the bass clef, the tenor or treble clef being used for the higher notes. The quality of its tone is even more sympathetic than that of the violin, and instruments by the old makers command equally high prices. It superseded the viol da gamba in the early part of the 18th century.

Vionville, a small village of Lorraine (pop. 450), 20 miles W. of Metz, famous for the great cavalry battle (sometimes named from the adjoining village of Mars-la-Tour) of 16th August 1870, when the French were driven back on Metz.

Viotti, GIOVANNI BATTISTA (1753–1824), violinist and composer, born in Piedmont, studied in Turin, and in 1780 played in Germany, France, England, and Russia with eclat. He settled in Paris, but in 1795–1815 was in London, where, after another sojourn in Paris, he died. He composed concertos, sonatas, and stringed quartetts, and influenced musical taste by his own admirable playing and by his teaching.

Viper (*Vipera*), a genus of venomous snakes, representative of the family Viperidæ. This family includes many important forms—e.g. the Common Adder (*Vipera* or *Pelias berus*); the Asp (*V. aspis*), extending as far north as Sweden; the African Horned Viper (*V. cerastes*) and Puff-adder (*Clotho* or *Echidna arietans*); the Indian Daboia or Russell's Viper (*Daboia russellii*); and the Indian *Echis carinata*. The head is relatively broad, somewhat triangular, and generally covered with scales; the eye has a vertical pupil, and there is no pit between it and the nostril; the maxilla bears on each side one functional fang, usually with several reserve-fangs beside it; the poison is virulent. The vipers are widely distributed through the Old World and in Australia; the majority are African. As far as is known they are viviparous.

The common viper or adder is the only poisonous snake indigenous to Britain. It lives especially on dry heaths and waste places, often among stones and brushwood; it is commoner in Scotland than in England, and does not occur in Ireland. It is widely distributed throughout Europe. Often confused with the innocent Grass-snake (*Tropedonotus natrix*), it may be distinguished by its markings. It has two diverging marks between and

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rather behind the eyes, a spot on each side of the hinder part of the head, a row of confluent rhomboidal spots running zigzag along the upper surface the whole length of the body and tail, and a row of small irregular, almost black, triangular spots on each side. The under parts are of a lead colour. The characteristic markings are almost invariable; but the ground colour varies considerably, from nearly olive, rich deep brown, or brownish yellow, to almost black. Thus in some parts of England a 'Black Viper' is occasionally met with; its ground colour a rich black, and the markings of a more intense black than the rest.

Common Viper or Adder (*Vipera* or *Pelias berus*).

There is also the 'red' and the 'blue-bellied,' and an almost white viper, with black markings. The viper seldom exceeds two feet in length. It feeds on mice, frogs, small birds, and other small animals, which are killed by its poison-fangs, and swallowed entire. It hibernates during several months of the year, and several may then be found twined together in a torpid state. It is a good swimmer, and may occasionally be seen on lakes such as Loch Lomond, crossing from one island to another. The young are produced in early summer, from ten to fifteen or more at a birth. The eggs have soft, thin envelopes, and are hatched within the oviduct. The young viper is coiled up so closely in the egg as to appear almost a solid mass, but the moment it is set free it is active, and ready to throw itself into an attitude of defence.

Young Viper's Position in the Egg.

It has often been alleged that in times of danger the young of the viper seek refuge in their mother's open mouth, and find temporary protection in her œsophagus; but, although this unlikely habit is not impossible, the fact is not supported by sufficient evidence. The viper is naturally shy of man, but when trod on or provoked is of course ready to defend itself by biting. The bite is painful, and, though not dangerous to healthy adults, is apt to be attended with more serious consequences in the case of children or those of weak constitution. Fatal cases are exceedingly rare. For remedies, see SNAKES, p. 532; and for the proverbial deafness of the adder, see SNAKES, p. 529.

The name Viper (Lat. *Vipera*) is manifestly a contraction of *Vivipera* for *Vivipara*. The name Adder arose from writing *an adder*, for *a nadder*. The A.S. is *nædre*, Old Eng. *naddere*, *neddere*, or *addere*, Scot. *nether*. Pliny, Galen, and other ancient writers ascribe great medicinal virtues to broth made of vipers, and to the flesh of the animal. Vipers twined together in hibernation were supposed to produce the *Ovum Anguineum*, to which virtues were attributed; and *snakestones* as charms were at one time common in Britain. They were either marbles or glass beads of various forms, supposed to cure vipers' bites, and to be otherwise useful.

Viper's Bugloss (*Echium*), a genus of plants of the natural order Boragineæ, having a calyx with five deep segments, an almost bell-shaped corolla, with dilated throat, and irregular limb, very long unequal filaments, and a bifid style. The species are large herbaceous plants or shrubs, rough with tubercles and hairs. Their flowers are often very beautiful. The Common Viper's Bugloss (*E. vulgare*), a large annual plant, is a native of Britain and of most parts of Europe, growing in dry places, not unfrequently in cornfields. Its flowers are at first reddish, and afterwards blue. It derives its name, Viper's Bugloss, from spots on its stem, which somewhat resemble those of the viper; and the property of healing vipers' bites was therefore ascribed to it. Other herbaceous species are found in the south of Europe, North and South America, and other parts of the world. Shrubby species are found chiefly in the Canaries and South Africa.

Viper's Bugloss (*Echium vulgare*).

Virchow, RUDOLF, pathologist and publicist, was born 13th October 1821 at Schivelbein in Pomerania, studied at Berlin, and in 1843 became prosector at the Charité there. In 1847 appointed a university lecturer, next year in the revolutionary fervour he got into disfavour, and was invited in 1849 to Würzburg as professor, but in 1856 returned to Berlin as professor and director of the pathological institute. He founded, edited, and contributed to several important medical journals, took part in numerous commissions, and speedily became one of the foremost pathologists in Europe, making very important contributions to many departments of pathological and physiological science. He rendered important services to archæology and anthropology in connection with such subjects as lake-dwellings and cave-men, skulls from Trojan graves and Egyptian tombs; and as a politician has long been one of the most influential leaders of the advanced liberals of Prussia, where in 1862 he was first elected a member of the Prussian chamber. Of his innumerable works on medical and anthropological science *Cellular Pathology as based on Histology* (1850; 4th ed. 1871; Eng. trans. 1860) is the most famous. Others are *Famine Fever* (trans. 1868), *Freedom of Science* (trans. 1878), *Infectious Diseases in the Army* (1879), *Post-mortem Examinations* (trans. 1878), and treatises on trichiniasis, hygiene and sewerage, barracks, &c. He has exercised great and beneficent influence in the improvement of asylums and hospitals. See W. Becher, *Rudolf Virchow* (Berlin, 1891).

Vire, an ancient and pretty town of Normandy, in the dept. of Calvados, on the Vire, 35 miles SW. of Caen. It stands on a rock, is built of granite, and is surrounded by hills, between which are the beautiful valleys of Vire—*Vaux de Vire* (see VAUDEVILLE). Pop. (1891) 6635.

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Virgil (Publius Vergilius Maro), the first of Latin poets and one of the three or four chief poets of the world, was born at Andes near Mantua on the 15th of October 70 B.C. The plain of Lombardy then lay outside of the limits of Italy, and formed a province known as Cisalpine Gaul. The population was mainly Celtic, but was already permeated by the Latin language and civilisation; and Julius Cæsar, when he admitted it to full Roman citizenship in Virgil's twenty-first year, was adjusting rather than extending the natural limits of Italy. The name Vergilius is apparently Celtic, and in Virgil's Celtic blood modern critics have found the origin of his romantic and melancholy temper, and of the deep sense of natural beauty and the spiritual meaning of nature, in which he stands alone among Greek and Latin poets.

Virgil's father owned a small property in his native place, where, besides the ordinary work of a farm, he occupied himself in forestry and bee-keeping. He was well enough off to give his son the education which was generally confined to a wealthier class. The boy was sent to school at Cremona and Milan, and at the age of sixteen went to Rome and studied rhetoric and philosophy under the best teachers of the time. His studies were probably interrupted by the civil war; at all events, we know nothing of the next years of his life till 41 B.C. The victorious triumvirs were then providing for the immense armies which had been disbanded after the battle of Philippi by settling them on confiscated lands throughout Italy. Virgil's farm was part of the confiscated territory of Cremona; but his reputation as a rising poet had already brought him under the notice of the governor of the district, Asinius Pollio, himself a distinguished man of letters. By Pollio's advice he went to Rome, with special recommendations to Octavianus; and though his own property was ultimately not restored to him, he obtained ample compensation from the government, and became for a few years one of the circle of endowed court-poets who gathered round the prime-minister Mæcenas. In 37 B.C. the *Eclogues*, a collection of ten pastorals modelled on those of Theocritus, were published, and received with unexampled enthusiasm. Soon afterwards Virgil withdrew from Rome to Campania. The munificence of Mæcenas had placed him in easy and even affluent circumstances. He had a villa at Naples, and a country-house near Nola, within easy reach of it; and he seems to have lived almost entirely in this neighbourhood during the seven years in which he was engaged on the composition of the *Georgics*, or *Art of Husbandry*. This poem, which is in four books, and deals with tillage and pasturage, the cultivation of trees, especially the vine and olive, and the breeding of horses, cattle, and bees, appeared in 30 B.C., and confirmed Virgil's position as the foremost poet of the age. The remaining eleven years of his life were devoted to a larger and in some respects more uncongenial task, undertaken at the urgent and repeated request of the emperor, the composition of a great national epic. During these years he lived a secluded life, chiefly in Campania and Sicily; he seems also to have travelled in Greece, and to have paid occasional visits to Rome, where he had a house in the fashionable quarter on the Esquiline. The subject he chose was the story of Æneas the Trojan, the legendary founder of the Roman nation and of the Julian family, from the fall of Troy to his arrival in Italy, his wars and alliances with the native Italian races, and his final establishment in his new kingdom. By 19 B.C. the *Æneid* was practically completed, but Virgil had set apart three years more for its final revision. In the summer of that year he left Italy with the intention of travelling in Greece and Asia; but at Athens he fell ill, and returned only to die at Brundusium a few days after landing, on the 21st of September. He had almost completed his fifty-first year. In his last illness he expressed a wish to burn the *Æneid*, and he left directions to that effect in his will. By the command of Augustus these directions were disobeyed, and it was published as we now possess it. At his own wish he was buried at Naples, on the road to Pozzuoli, his tomb for many hundreds of years after being worshipped as a sacred place.

In person Virgil was tall and dark, shy and silent in manner, and suffering from delicate health throughout his life. No authentic portrait of him exists. He never married, and from his will it would appear that a half-brother was the only near relation whom he left. His sincerity and sweetness of temper won the warm praise of Horace, who is not lavish of praise, and the fastidious purity of his life in an age of very lax morality gained him the same name of *the lady* by which Milton was known at Cambridge.

Besides the three works already mentioned, a few juvenile pieces of more or less probable authenticity are extant under his name. These are the *Culex* and the *Moretum*, both in hexameter verse, the former an 'epyllion,' or short poem of narrative and description in the epic manner, the latter an idyll freely translated from the Greek of Parthenius; the *Copa*, a short elegiac piece; and fourteen little poems in various metres, some serious, others trivial, which come under his name at the head of a collection of minor Latin poetry incorporated in the Latin Anthology. These pieces are not printed in most editions of Virgil, nor are any of them certainly authentic, though some of them passed as his among scholars within a century after his death. The *Ciris*, a piece of the same kind as the *Culex*, is now agreed to be by a contemporary imitator.

The supremacy of Virgil in Latin poetry was immediate and almost unquestioned. The enthusiasm excited by the *Eclogues* rose partly from the recognition in them of a new sense of romantic beauty, partly from the feeling that a Roman artist had at last appeared who could be set beside the great artists of Greece. In the hands of Lucretius and Catullus the intractable Latin tongue had proved able to express impassioned argument and vivid emotion; in the *Eclogues* it assumed a richness, harmony, and sweetness till then quite unknown. The promise shown in the *Eclogues* was more than fulfilled in the *Georgics*. In no work of ancient or modern art is there a more sustained splendour, an ampler music of language, a more magical fusion of thought and feeling. The workmanship of the *Æneid* is more unequal; but in its great passages there is the same beauty, with an even fuller strength and range. Virgil left the Latin language to his successors as an instrument of which he had sounded the full compass and developed the entire capacity; subsequent Latin poetry has to be estimated by the degree in which it falls short of his. There were some in ancient as in modern times who continued to prefer the direct force and austere simplicity of Lucretius to Virgil's rich and intricate harmonies; but for the world Virgil was the imperial poet, the great voice of Rome.

In estimating Virgil's place among the great poets of the world different natures will lay stress on different qualities as constituting the essence of the highest poetry. Virgil is not comparable to Homer in dramatic force and in the fresh charm of his story; he has not the concentrated passion of Pindar and Dante; and the lyrical cry of direct

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emotion, such as thrills us in Sappho or Catullus, belongs to a different order of art from the majestic sadness, the serene and harmonious cadences, of poetry enriched with all the associations of art and learning, and wrought by patient labour into the most exquisite finish. But what Virgil has in a degree that no other poet has ever equalled is pity; the sense of 'tears in things,' to which in the most famous of his single verses (*Aen.* i. 462) he has given imperishable expression, and which fills with strange insight and profound emotion those lonely words and pathetic half-lines where he has sounded the depths of beauty and sorrow, of patience and magnanimity, of honour in life and hope beyond death.

The reputation of Virgil from his own time till now is probably unparalleled in its continuity. His works were established classics even in his lifetime, and soon after his death had become, as they still remain, the school-books of western Europe. By the 3d century his poems ranked as sacred books, and were regularly used for purposes of divination. The purity and piety in which he is eminent beyond other Latin poets, together with the mystical interpretation of the fourth *Eclogue*, which found in him an unconscious channel of divine inspiration and a 'prophet of Christ among the Gentiles,' made his fame almost as high in the Christian as in the pagan world; of all the testimonies borne to his matchless power in stirring the deepest human emotions the subtlest and most eloquent are those of two princes of the Catholic Church nearly fifteen centuries apart from one another—Augustine and Newman. In the dark ages his fabled powers as a magician almost eclipsed his real fame as a poet; but with the revival of learning he resumed his old place; for Dante and Petrarch, and for the whole of the earlier and later Renaissance, he was the first of the world's poets. In the earlier part of the 19th century his reputation for the first time suffered serious eclipse. The spiritual upheaval of the age which followed the French Revolution turned for inspiration to fresher sources; and in the general anarchy of taste which followed Virgil fell out of fashion among readers too capricious or too impatient to feel his charm. Criticism has now returned to a juster view, and the most recent estimates of Virgil, both in France and England, are also the most appreciative, not only of his immense learning and of the wonderful truth and refinement of his descriptions, but of his eminence in all the essential qualities of poetry. Of his consummate mastery of metre and diction there has never been any question; even those who have thought least of his dramatic power or imaginative insight have acknowledged the finished beauty of his language, and the stately and haunting music of his verse, to which the noblest of tributes has been given by Lord Tennyson, himself the most Virgilian of modern poets.

There are extant MSS. of Virgil of as early a date as the 4th century. Virgil was first printed at Rome by Sweynheym and Pannartz in or before the year 1469, the edition consisting of 275 copies. Of the many hundreds of subsequent editions the most important are those of Heyne (1767–75; enlarged in subsequent editions and afterwards re-edited by Wagner) and Ribbeck (1859–68). Both of these include the minor poems. The standard English edition is that of Conington and Nettleship (4th ed. 1881–83), and there are good smaller editions by Kennedy, Papillon, and Sidgwick. The commentary by Keightley is almost indispensable in reading the *Georgics*. Among verse translations that of Dryden still holds a high place; others which deserve special mention are those of Lord Justice Bowen (incomplete), Mr William Morris (*Æneid*), Calverley (*Eclogues*), and Rhodes (*Georgics*). There are prose translations by Conington and by the present writer. The best estimates of Virgil as a poet are those of the late Professor Sellar in *The Roman Poets of the Augustan Age*, of Sainte-Beuve in his *Étude sur Virgile*, and of Mr F. Myers in his *Classical Essays*; and beyond all, Lord Tennyson's lines 'To Virgil' in *Teiresias and other Poems*.

VIRGIL THE MAGICIAN.—Not the least remarkable circumstance in the history of Virgil is the reputation of the magician which the mediæval imagination persistently associated with his name. His undisputed supremacy and the peculiar fascination of his poetry made easy the notion of a wisdom and mystic meaning wrapped up in his verses, and as early as the 3d and 4th centuries we find Christian authors like Minucius Felix, Lactantius, and Augustine separating him from all other pagan writers. Messianic prophecy was read into his fourth Eclogue, and Virgil and the Sibyl were actually introduced into the liturgy of the church, along with the Messianic prophecies of the Old Testament, as witnesses to a coming Messiah. Had not St Paul visited Virgil's tomb at Naples, and did not Statius owe his conversion to the fourth Eclogue? Centos were manufactured out of the *Æneid* giving the whole of sacred history in epitome. And already under the Roman empire it was customary enough to discover one's fortune by selecting lines at random from his epic—the famous *Sortes Virgilianæ* (q.v.). Ultimately in the *Divina Commedia* of Dante the 13th-century Virgil became a representative of enlightened reason, a gifted genius standing midway between paganism and Christianity. This deep half-religious veneration for Virgil, together with the scholastic conception of his superior wisdom, especially in mathematics and medicine, helps us to understand Dante's conception of the *vates sacer;* in the contemporary *Dolopathos*, a special version of the Seven Wise Masters (q.v.), we see the mythopœic process at work, the name of Virgil taking the place of the sage Sindibad.

It was out of Neapolitan folklore that the legendary reputation first grew, gaining many strange accretions from all sides on its course. But the earliest literary accounts were not Italian. The first writer to mention it is John of Salisbury in his *Polycraticon de Nugis Curialium et Vestigiis Philosophorum* (1156), who describes Virgil as making for Marcellus a fly that would destroy all other flies. But the first artistic treatment of the theme is seen in the letters of Conrad of Querfurt, afterwards Bishop of Hildesheim, the representative of the Emperor Henry VI. at Naples. He tells us he had seen the palladium of Naples (a model of the city enclosed in a narrow-necked bottle) and many other talismans and charms wrought by Virgil's skill—the most useful, the statue of an archer pointing an arrow at Vesuvius, which prevented its eruptions. These stories occur again with additions in Alexander Neckam's *De Naturis Rerum*, in the *Otia Imperialia* of Gervase of Tilbury, the French poem *Image du Monde* (1245), where the famous brazen head appears, as well as the first thread of love. In the rhymed *Weltbuch* of Johann Enenkel of Vienna (1250) we read how Virgil, finding the devil imprisoned in a glass bottle, released him after he had learned all his magic arts. His first task was the creation of a perfect woman. But not content with her he made love to a married woman of Rome who befooled him by a pretended assignation, and left him exposed to public ridicule hanging half up to her window in a basket. This last was an exceedingly popular mediæval story, and was even carved on the misereres of churches. In the *Roman de Cleomadés* of Adenés li Rois (*c.* 1290) we find the first mention of Virgil's figure holding the mirror at Rome which showed if treason was hatching anywhere—the famous *Salvacio Romæ*—as well as the copper statue of an

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archer whose arrow pointed at the public fire kept it alive; his magic garden we first meet in Padre Giordano's contemporary Life of San Guglielmo of Vercelli. The old stories again occur in the French romance of the *Renard Countrefait* (*c.* 1319); his compacts with the devil, with much detail, in the 14th-century German poems *Reinfrit von Braunschweig* and the *Wartburg-Krieg*. The earliest attempt in Italy to weave all the varying legends into a collected form is the prose *Cronica di Partenope* of Bartolommeo Caracciolo (1382). In the *Process of the Seven Sages* (1330), the English form of the *History* thereof, the ninth tale is devoted to the 'nigramancie' of Virgil at Rome, and the same reappears in the *Gesta Romanorum* (No. 27). The latest stages of the legend may be seen in *Le Myreur des Histors*, written at Liége by Jean d'Outremeuse in the 14th century; the English *Lyfe of Virgilius* (1510; reprinted in W. J. Thoms's *Early English Prose Romances*); its French version, the *Faicts Merveilleux;* and in the Spanish *Romance of Virgilius* (1550). In the *Faicts* Virgil makes a statue the sight of which ensures the virtue of women. His own wife and other licentious Roman ladies try to break it, but in vain. He carries off the beautiful daughter of the Soldan of Babylon, baffles her father by sorcery, builds Naples, and establishes there a school of necromancy.

Professor Comparetti thinks these legends of popular and Neapolitan origin, but recognises in them two elements, the first exclusively Neapolitan connected with the notion of a special intimate affection of Virgil for the city; the second consisting of the distinct and not merely Neapolitan belief in certain public talismans attributed to Virgil, analogous accretions of legend being associated with most monuments of antiquity. Mr. J. S. Tunison, in his *Master Virgil* (Cincinnati, 1888), labours to prove that the legend is originally of northern not southern origin, and of literary rather than popular genesis, the first writers who related tales of Virgilian magic being Norman Latinists of England and France.

See Zappert, *Virgil's Leben und Fortleben im Mittelalter* (Vienna, 1851); Roth in Pfeiffer's *Germania* (vol. iv. 1859); Milberg, *Mirabilia Vergiliana* (Meiss. 1867); Professor Dom. Comparetti, *Virgilio nel Medio Evo* (2 vols. 1872; Ger. trans. 1875: see *Quarterly Review*, July 1875); and Professor A. Graf, *Roma nella Memoria e nelle Immaginazioni del Medio Evo* (2 vols. 1882–83).

Virgil, POLYDORE. See VERGIL.

Virginal, or VIRGINALS. See HARPSICHORD.

Virginia, a middle Atlantic state of the American Union, separated from Maryland by the Potomac River and Chesapeake Bay, and also by an arbitrary line 25 miles in length across the eastern shore; on the south it adjoins North Carolina for 326 miles and Tennessee for 114 miles; on the west and north-west are Kentucky (115 miles) and West Virginia (450 miles, in a very irregular line). The greatest length from east to west is 475 miles, and the greatest width from north to south 190 to 200 miles. It has a land area of 40,125 sq. m. and a water area of 2325 sq. m.

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The surface of the state consists of a series of belts extending from north-east to south-west parallel to the trend of the coast on the east and the ranges of the Appalachian Mountains on the west. These divisions rise one above another from the coast westward, forming a stairway of ascending elevations. They differ in aspect, soil, climate, geological structure, and products. The tidewater region, penetrated by the waters of the ocean, of Chesapeake Bay and its inlets, and of the tributary streams, is divided into numerous peninsulas, and has a coast-line of nearly 1500 miles. The peninsula of the eastern shore and the Norfolk peninsula are low, rising but 20 or 30 feet above sea-level, and form the first in the series of ascending steps. The other peninsulas rise higher, forming the second and third terraces. Westward from the head of tidewater lies the middle country, an undulating plain from 25 to 100 miles wide, broken in places into ridges by outliers of the Appalachian Mountains and by the transverse valleys of the streams. The fifth ascent is the Piedmont plateau, having an elevation of from 300 to 500 feet, and diversified by numerous valleys and 'coves' formed by the broken coast-ranges and projecting spurs of the Blue Ridge. This eastern range of the Appalachians form the next division, and for two-thirds of its length within the state simply constitutes the divide between the Piedmont country and the Great Valley to the west. In the south-west it expands into a broad plateau, which, extending into North Carolina, forms the culminating portion of this mountain-system. The range consists of a series of domes connected by long ridges with many side spurs. The height of the mountains increases toward the south-west, as does that of the surrounding country. The Great Valley lies between the Blue Ridge and the western Kittatinny or North Mountains. Though this valley is continuous it has four watersheds and contains the minor valleys of the Shenandoah, the James, the Roanoke, the Kanawha, and the Houlston or Tennessee rivers. The last of the belts belongs to the Appalachian mountain-region, and is styled 'Appalachia.' It may be described as a series of long narrow valleys 2000 feet or more above the sea, enclosed between the long parallel ranges of the Alleghany Mountains. About six-sevenths of the state is drained by the streams of the Atlantic system. The important rivers are the Potomac, Rappahannock, York, James, Blackwater, and Roanoke. The remaining seventh is drained mainly by the Kanawha or New River, the Houlston, and the Clinch, which are tributary to the Ohio. Virginia is famous for the number and value of its mineral springs. The Natural Bridge, in Rockbridge county, and the many caverns are among the objects of interest to tourists.

With its diversified surface and its position near the sea Virginia has a climate which varies with the locality. Except in the swampy portions of the tidewater district it is remarkably pleasant and healthful. The mean annual rainfall is from 40 to 45 inches, and is well distributed throughout the year. The soils are mostly fertile, and the state contains extensive forests. Along the shores of the tidewater region and in the marshes waterfowl of various kinds are abundant, and elsewhere partridges or quails, pigeons, grouse, wild turkeys, and other game birds are found. Deer are numerous in many sections. The fisheries are important, and supply large quantities of fish, which are shipped to other states. Oyster-culture is engaged in. Indian corn, oats, and barley are extensively grown. The products of market-gardens and orchards are especially valuable on account of the facility with which they may be carried to the great Atlantic seaports. Tobacco has always been a staple crop in this state, and the 'Virginia leaf' is noted throughout the world for its excellence. Among the mineral products are marls, choice sands and clays, granites, limestones, marbles, and other building stones, iron, lead, and zinc ores in abundance, gold in the middle region, at one time worked quite extensively, and bituminous and anthracite coal. The coal-field which occurs in the Triassic sandstones in the vicinity of Richmond yields, besides a bright, black, bituminous coal, a remarkable natural coke; but the most

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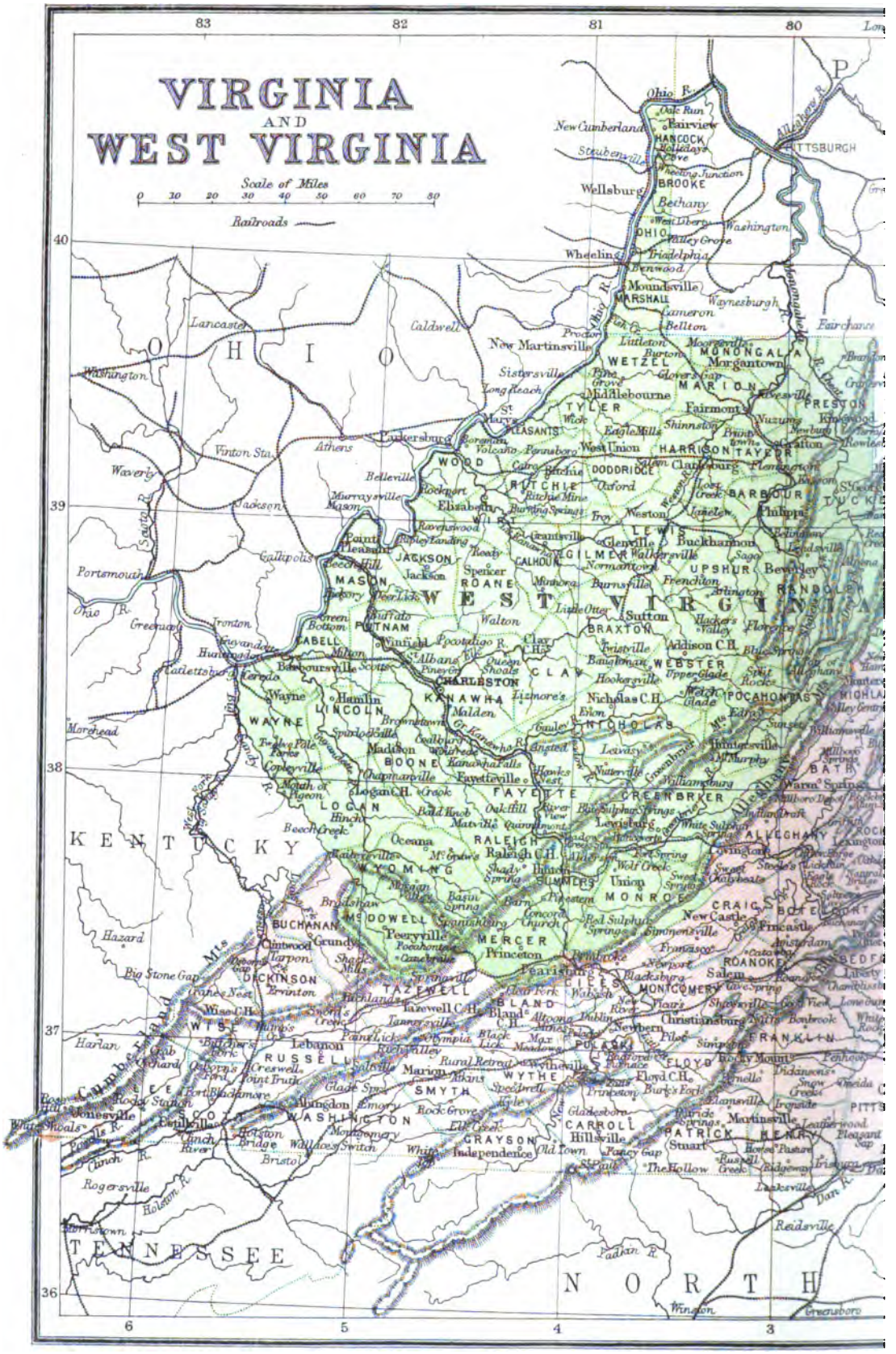

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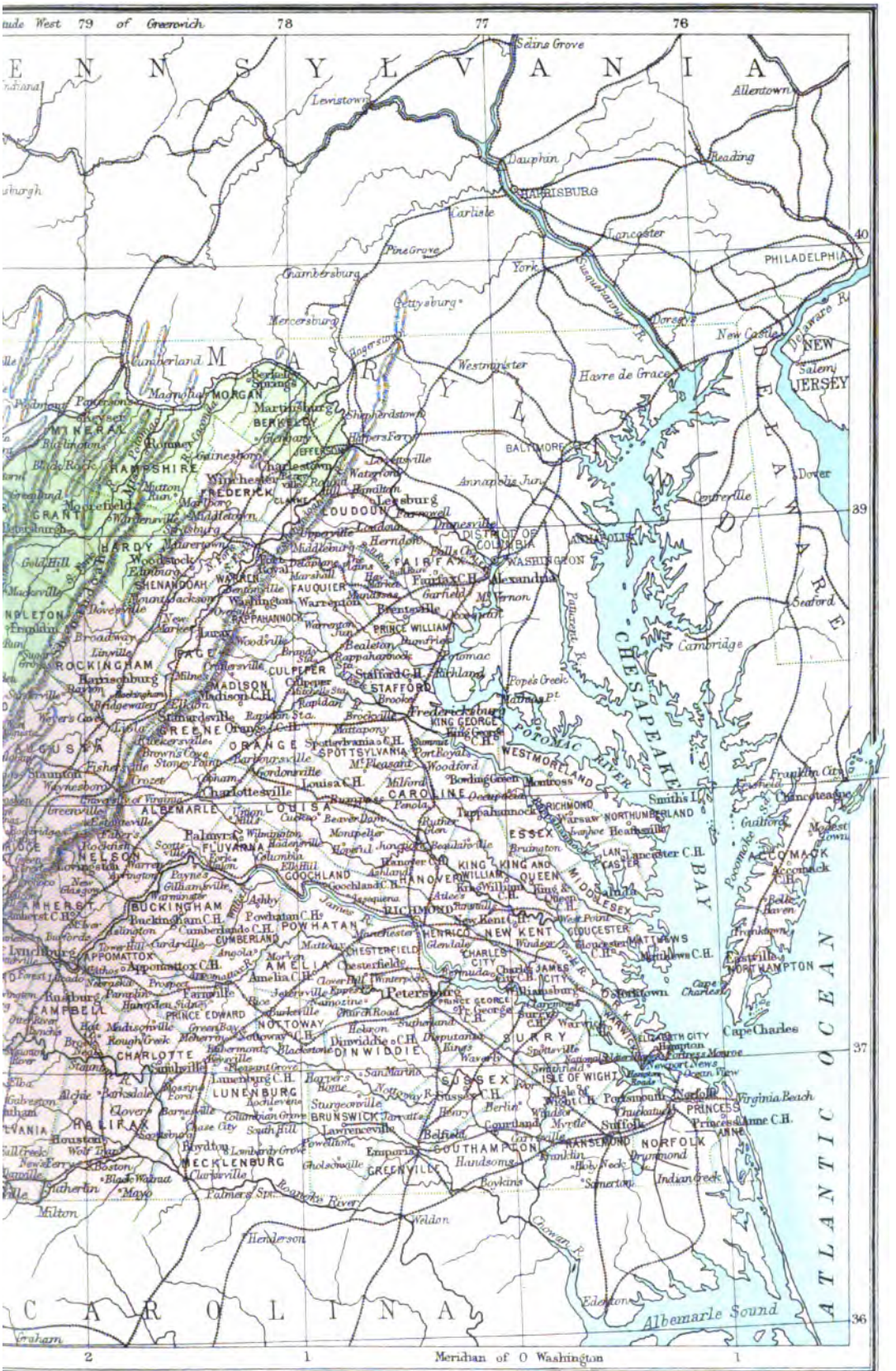

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thoroughly worked coal area is the Pocahontas field in the south-west. The mining and manufacturing interests of the state are rapidly increasing. Facilities for transportation are excellent. The enormous water-front affords ample opportunities for reaching all the leading markets by steamers and sailing-vessels, and in 1890 there were within the state 3368 miles of railroad.

Virginia has 100 counties. There are thirty towns having a population of more than 2000. The most important cities are Richmond, the capital, Norfolk, Petersburg, Lynchburg, Roanoke, Alexandria, Portsmouth, and Danville. The state maintains an excellent system of public schools, and private schools, academies, and colleges are numerous. Among the more important institutions of higher learning are the University of Virginia, the Agricultural and Mechanical College, the Virginia Military Institute, Emery and Henry College, Roanoke College, Hampden and Sydney College, Washington and Lee University, and Richmond College.

The history of Virginia is perhaps more romantic and heroic than that of any other state of the Union. It was here that the first lasting colony was established by the English. At Jamestown was held the first representative assembly in America. With its early period are associated the names of Captain John Smith and Pocahontas. Such was the prosperity of the colony that at the end of the colonial period Virginia was the most populous and wealthy of the thirteen colonies. In the protest against the Stamp Act and the encroachments of Great Britain Virginia took the lead, and in the revolutionary struggle furnished such noted sons as Washington, Jefferson, Patrick Henry, the Lees, and Madison. At Yorktown the surrender of Cornwallis put an end to the contest. In the civil war Virginia furnished the commander of the Confederate forces, General Robert E. Lee, and on its soil the last battle was fought, and the final surrender was made. Of the first twenty-one presidents of the country seven were natives of Virginia. Pop. (1800) 880,200; (1860) 1,596,318; (1870, after the separation of West Virginia) 1,225,163; (1880) 1,512,565; (1890) 1,655,980 (640,867 coloured).

See *The New Virginians* (2 vols. Edin. 1881); T. Bruce, *South-west Virginia and Shenandoah, Growth*, &c. (Richmond, 1891).

Virginia. See CLAUDIUS (APPIUS).

Virginia, UNIVERSITY OF, at Charlottesville, Albemarle county, Virginia, 4 miles from Monticello, the seat of Jefferson, by whom it was planned and organised. It was chartered by the state in 1819, opened in 1825, and has over 300 students and a library of 40,000 vols.

Virginia, WEST. See WEST VIRGINIA.

Virginia City, capital of Storey county, Nevada, is built, 6200 feet above the sea, on the eastern side of Mount Davidson, 21 miles by rail NNE. of Carson. It owes its existence to its silver-mines, the principal being the Comstock Lode (q.v.) and the Big Bonanza. Pop. (1880) 10,917; (1890) 6377.

Virginia Creeper (*Ampelopsis* [*Parthenocissus*] *quinquefolia*), an American vine, known also as American Ivy, Woodbine, &c., often grown on the fronts of houses in Britain and continental Europe as an ornamental creeper. The tendrils terminate in a peculiar kind of sucker, and the autumnal foliage is rich in varied colour of light and dark green, brown, red, and yellow.

Virginian Deer. See CARIACOU.

Virginian Quail. See QUAIL.

Virginian Stock. See STOCK.

Virginia Water, an artificial lake, nearly 2 miles long, formed in 1746 by the Duke of Cumberland in the Great Park at Windsor, is 5 miles S. of the castle, and is mainly in Surrey, but partly in Berks.

Virgin Islands, a group of islands in the West Indies, about fifty in number, but only a few of them of any considerable size or importance. The total area is about 250 sq. m., and the population is near 45,000. Three of the islands, St Thomas, Santa Cruz, and St John, belong to Denmark, having a total area of 120 sq. m. and a pop. of 34,000. Spain claims Bieque, or Crab Island, and Culebra (together 65 sq. m.), the former of which has 2500 inhabitants, and the latter is uninhabited. The others are British; total area, 58 sq. m.; pop. (1881) 5287; (1891) 4639, of whom only about 150 are whites. The chief of the British Islands, which form a district of the colony of the Leeward Islands, are Tortola, Virgin-Gorda, and Anegada. The exports have a value of near £5000, and the imports of from £3000 to £7000. Extensive tracts of land, possessed by the emancipated blacks, form good pasturage for cows, sheep, and goats; cotton, sugar, and fish are the other principal products.

Virgin Mary. See MARY.

Virgin's Bower. See CLEMATIS.

Viriathus, a Lusitanian herdsman, who became a guerilla leader against the Romans, escaped the treacherous massacre by the proprætor, Ser. Sulpicius Galba (151 B.C.), soon mustered a large force, and defeated army after army of the Romans. At length he hemmed in the consul, Q. Fabius Servilianus (141), in a defile, and forced him into unconditional surrender, on condition that the Lusitanian independence should be assailed no further. But next year Q. Servilius Cæpio treacherously resumed the war against Viriathus, and ended it by successfully bribing some of his officers to murder him.

Viridian is a bluish-green pigment of much depth and purity. It is a hydrated sesquioxide of chromium, and is a valuable modern addition to the artist's palette. Neither light nor sulphuretted hydrogen gas has any action upon it, and it mixes with other colours without injuring them.

Virtues. See CARDINAL VIRTUES, and SEVEN.

Virus (Lat., 'slime,' 'poison'), specially the contagium of an infectious disease. See CONTAGION, INFECTION, DISEASE, GERM, SNAKES, POISON, VENOMOUS BITES, and the articles on the infectious diseases.

Viscacha, or BIZCACHA (*Lagostomus trichodactylus*), a species of Rodent belonging to the same family as the Chinchilla (Chinchillidæ), occurring over an immense territory on the South American Pampas and adjoining country from the Uruguay River to the Rio Negro. It is a gregarious burrower, nocturnal in its habits. Twenty or thirty live together in their villages of deep burrows, around which they keep a patch of close-cropped turf in good order, so that their numerous enemies are descried at sufficient distance to allow the slow-footed rodents time to scuttle into the pit-like mouths of the burrows. The earth brought up from the burrows forms a mound from 15 to 30 inches above the plain; and so numerous are the 'Vizcacheras' in some parts of the Pampas (especially the settled parts) that one cannot ride half a mile without seeing one or more of them. Burrowing owls and other birds also make themselves at home on the mounds of the viscacha. In unsettled regions the tame familiar rodent has deadly enemies in the puma and the jaguar. The fox, on the other hand, often establishes himself in

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a viscacha's burrow, and is not regarded by the full-grown natives with dread, though he lives largely on the young viscachas that get in his

Viscacha (*Lagostomus trichodactylus*).
(From Hudson's *Naturalist in La Plata.*)

way. The viscachas often ruin much of a sheep-farmer's best pasture. A full-sized male is 22 inches in length to the root of the tail, the female somewhat smaller. See Hudson's *Naturalist in La Plata* (1892).

Vischer, PETER, artist in bronze, was born at Nuremberg in 1455, and died there 7th January 1529. Among his most notable works are the tomb of Duke Ernst in the Dom at Magdeburg, St Sebald's shrine at Nuremberg, and a relief in the cathedral at Ratisbon; and in virtue of these and other works he was reckoned by contemporaries as the next artist to Albert Dürer. His sons, Hermann, Hans, and Peter Vischer the younger, were also distinguished as sculptors and workers in bronze.

Visconti, a Lombard family who for nearly 200 years exercised supreme sway over Milan (q.v.).

Viscosity is the property of matter which is in evidence when the relative motion of parts of any body or substance decays on its being left to itself. The gradual cessation of waves on the sea or of wind in the air, the dying away of sound, the frittering away of the energy of a tuning-fork are illustrations of the effect of viscosity. The property is possessed by all substances, gaseous, liquid, and solid. The kinetic theory of gases gives a very simple explanation of viscosity in fluids, or fluid friction as it is also called. Suppose, for example, that there are two contiguous layers of gas flowing with different speeds. This fact will not prevent the individual molecules diffusing across the interface that separates the two regions. Thus the one layer will on the whole gain momentum, and the other lose it, in the direction of motion of the latter. The tendency will be to an equalisation of momentum of the two regions, and the rate at which this takes place across unit area is the measure of the viscosity. Although the molecules of a liquid have not so great freedom of individual motion as have those of a gas, still it is easy to see that a similar interaction will take place between contiguous finite portions moving relatively to one another. The action will no doubt involve dissociation or the breaking up of groups of molecules which assume other and for the moment more stable configurations. According to Maxwell's theory of the constitution of bodies, the difference between a liquid and a solid is that in the former all the groups of molecules readily break up, while in the latter only a small number do so. But it is evident that, if only one of a vast number of molecular groups so yields to the stresses acting on it, the perfect elasticity of the substance will be destroyed. The substance on recovering will not be able to give back the energy spent in deforming it. Any vibrating solid, such as a tuning-fork or wire undergoing torsional oscillations, loses more or less rapidly its energy of motion. In ordinary circumstances this loss is largely due to the resistance of the air, which is ultimately determined by its viscosity. But even if the vibrations were executed in a perfect vacuum there would still be decay of motion in virtue of the viscosity of the solid material itself. The amount of viscosity will depend upon the number of molecular groupings, which break up under influence of the imposed stresses and assume new configurations of stability. See ELASTICITY, FRICTION, STABILITY. It is interesting to note that the kinetic theory of gases implies, almost of necessity, the existence of viscosity, which is simply the diffusion of momentum.

Viscount (Old Fr. *viconte, visconte;* Lat. *vice,* 'in place of,' and *comes,* 'earl'), originally the officer who acted as deputy to the earl, the *vicecomes,* who ultimately became the sheriff (always Latinised by *vicecomes*). The hereditary title of viscount is a degree of nobility unconnected with office. It was first granted in England to John Beaumont, created a peer by the title of Viscount Beaumont in 1440. A viscount is now the fourth degree of nobility in the United Kingdom, intermediate between earl and baron, and has not been very largely conferred. The coronet is described at CORONET. A viscount is styled 'Right Honourable;' his wife is a viscountess; and all his sons and daughters are styled 'Honourable.' See COURTESY TITLES.

Vishni-Volotchok, a town of Russia in the government of Tver, 230 miles SE. of St Petersburg by rail. Pop. 11,590.

Vishnu, 'the Preserver,' the second god of the Hindu triad, now the most worshipped of all Hindu gods. Originally in the oldest Vedas a sun-god, he gradually increased in influence at the expense of other gods (see INDIA, Vol. VI. p. 105, 106), and in the later Purána (q.v.) is the supreme god. Always a friendly god, he became specially the friend and benefactor of man in his *avatars* or incarnations, of which in some reckonings there were ten, in others twenty-two—as fish, tortoise, boar, &c. But his chief incarnations were the seventh as Ráma, hero of the Rámáyana, and the eighth as Krishna, the more human hero of the Mahábhárata. The Vishnuite doctrines were gathered into one body in the 11th century as the Vishnu-Purána (see SANSKRIT). Innumerable sects of Vishnuites grew up, Vaishnavas, some of whom are named after reforming teachers, such as the Chaitanyas (see SANSKRIT). Of twenty principal sects and a hundred minor brotherhoods some are merely local, others are wealthy bodies and wide-spread, and one has grown into a warlike nation, the Jains (q.v.).

Visible Speech, a system of alphabetic characters, each of which represents the configuration of the mouth that produces the sound. It is the invention of Mr A. Melville Bell (q.v.), and was first published in 1867. Mr Bell's grouping of fundamental sounds according to the shape of the resonant cavities of the mouth in speaking has been already discussed at PHONETICS (Vol. VIII. p. 140). A special characteristic of the system is that the letters or symbols used, of which about thirty are radical, are mostly to a certain extent pictorial of the action of the organs which produce the sound. Thus a simple circle o represents breath issuing from the *open* throat (aspiration); while

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the *narrowing* of the glottis which produces vocal murmur is symbolised by ı, from which, by modifiers to indicate guttural, palatal, 'primary,' 'wide,' &c., all the vowel-symbols are formed. Contraction in the mouth is indicated by a ɔ, and the *part* of the mouth in which the contraction takes place is shown by the direction in which the symbol is turned—thus ɔ denotes contraction in the *back* of the mouth (Scotch and German *ch* in *loch*), ɔ denotes lip-contraction. Complete stoppage is indicated by drawing a line across the opening, giving a symbol resembling ɒ, which turned this way would represent the sound of *p*, while ɑ would represent *k*. The symbols for vocality, nasality, &c. are similarly incorporated into the consonant symbols.

Visigoths. See GOTHS.

Vision, the act of seeing, that faculty of the mind by means of which, through its appropriate material organ, the Eye (q.v.), we perceive (see also PERCEPTION) the visible appearances of the external world. Vision is mainly concerned with the colour, form, distance, and tridimensional extension of objects. It is caused by impact of ether-waves on the retina of the eye (see EYE); but if these waves be longer or shorter than a certain limit (see COLOUR) there is no visual impression produced by them. The apparent colour of an object depends partly on the wave-length or wave-lengths of the incident light-waves, single or mixed, and partly upon the state of the eye itself, as in Colour-blindness (q.v.), or after taking santonine, which makes external objects look yellow, or in jaundice. The apparent brightness of an object depends upon the amplitude of the light-waves which pass from it to the eye; and the smallest perceptible difference of brightness always bears a nearly constant ratio to the full intensity of the bright objects (Fechner's psychophysical law). As between different colours, the eye perceives them with different intensities, even when the physical intensity is the same: thus yellow appears brighter in a bright light than an equally intense red: and as light fades away the different colours fade away unequally, so that the ratio in Fechner's law above referred to is different for each colour: red and yellow disappear first, blue last; and thus in a dim light the blue is the brightest.

The leading problems in the theory of vision are, however, those which deal with the nature of our perception of distance and of three-dimensional extension. According to Bishop Berkeley, whose views (*On the Theory of Vision*) have met with the widest acceptance, we do not by means of sight perceive either that external objects are outside ourselves or their distance from us; but this knowledge is derived from touch and from our experience of motion from place to place; and as our experience is in general uniform, we come to associate the visible with the tangible so readily that we fancy we directly *see* visible objects. As regards the distance of any given point, Bishop Berkeley maintains that this cannot be seen, 'for distance being a line directed end-wise to the eye, it projects only one point in the fund of the eye; which point remains invariably the same, whether the distance be longer or shorter.' This may be true, and yet the eye may be obliged to put forth perceptibly different efforts in order to discriminate points situated at different distances. Rays proceeding from the distant point form a cone, whose base is the pupil of the eye; and in order to make this divergent cone converge on a point in the retina a distinct effort of focussing or accommodation is necessary for each distance. That the distance may be judged by means of the necessary effort of accommodation may be seen by taking a small thin-edged lens, holding it at arm's length, and viewing distant objects through it. A small inverted image of the distant objects is seen; but on trying to ascertain at what distance this image is situated, the necessary accommodation teaches us that it is situated between the eye and the lens. The effort of accommodation appropriate to each distance is the same whether the rays have actually come from the apparent distant point or not, so long as they approach at a certain angle of divergence: hence rays from clouds reflected in still, turbid water, and continuing their divergence after reflection, approach the eye, and are dealt with by it, as if they had proceeded from a great depth below the surface of the water. Similarly the apparent depth of objects under water is diminished because the amount of divergence of the rays is altered by refraction; and the apparent distance of an object is increased by repeated reflection because after such repeated reflection the rays originally diverging from the object reach the eye diverging as if they had come from a more distant point, the virtual apex of the incomplete cone of ultimately reflected rays.

The axis of the double cone of rays, first divergent as it approaches the eye, and then convergent upon the retina within the eye, fixes the direction of the apparent position of the point (which may or may not be the real position, according to circumstances), and the strain to which the eye is subjected in accommodation measures the apparent distance in that direction.

Further, we have not only to do with the effort of accommodation, but also with the varying amount of convergence of the two eyes, or of their 'optic axes,' required in order to fasten the gaze upon a more or less distant point; and this will be found to keep pace with the amount of accommodation required by each eye in order to ensure accurate focussing on the retina.

According to the Berkeleian view, however, these considerations involve geometrical questions the nature of which is known to few and is not consciously realised. But, on the contrary, it may be said that these operations of the eye being different for each distance of the object, and being felt to be so—as, for instance, where we look out through a window and feel that the sensation of looking out through the window is different from that of concentrating the gaze upon the window-bars—there is no need for the geometrical discussion of the problem; the facts of sensation are sufficient. Berkeley said that this difference of sensation does not come into play until the increased divergency becomes so great as to be associated with confused vision; and he maintained that this association was merely accidental, as was, in his view, shown by certain experiments with lenses, in which the withdrawal of the eye from a convex lens produced an apparent approach of the object looked at. This experiment was, however, shown by Wheatstone to be entirely explicable on the basis of an enlarged retinal image. Still the illusions produced by virtual images of objects, the rays reaching the eye *as if* they had come from points to which no physical reality corresponds, show that we rely in general upon the evidence of the sensations of adjustment which accompany vision for the materials as to our judgment of direction, of distance, and of externality; but we interpret these through our tactile experience. In the case of smoke and vapour, which are not tangible, we have a certain amount of experience as to the space and position occupied by them; and in the case of such an object as perfectly polished glass, which is invisible or practically so, we are left to the sense-fallacy that where the sight affords us no information, owing to the absence of any light-rays

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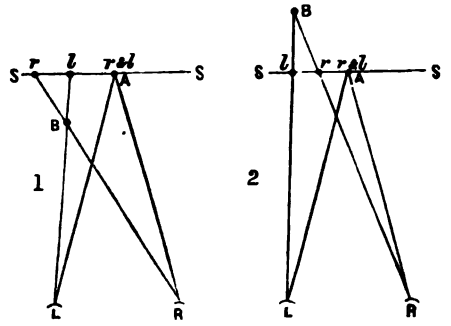
entering the eye from the object, the inference is drawn, as the basis of previous experience, that there is no tangible object to be taken into consideration. Similarly, with objects too minute for touch, we interpret the indications of sight—e.g. those arrived at with the aid of a microscope—as showing, by analogy, that if we could apply a sufficiently refined sense of touch we would feel the object to give rise to sensations corresponding to its external aspect. The two sets of sensations, visual and tactile, are essentially independent of one another; but the distance of an object and its external form in three dimensions are learned by comparing the sensations of touch, in the widest sense, with the sensations accompanying vision while the object is still beyond reach: and the experience acquired in infancy becomes a possession of the adult philosopher who has forgotten the mental processes by which he attained it. A mountain in a clear atmosphere, say in Colorado, may appear to a British eye to be small and near, when in reality it is high and far; but it does not take long to 'educate the eye'—that is, to furnish the mind with a store of experience sufficient as a basis for more accurate inferences.

On ordinary optical principles a point above the direct line of vision comes to a focus at a point of the retina below its centre, and *vice versâ*. If the retina could be looked at by another person it would be found that an image of the object is formed on the retina, and that this image is inverted. It has been much questioned how this inverted image can produce the sensation of direct vision. We may observe in the first place that the question is somewhat nugatory, since the individual never becomes directly aware of the inversion or, it may be, even of the existence of the physical image in his own retina; and secondly, that the individual has come strongly to associate, by experience, the top of an object with the act of looking up in order to see it, and *vice versâ*. Any increase in the magnitude of the retinal image is generally associated with approach of the object, and in the exceptional cases in which this result can be brought about by means of lenses, even where the real distance is increased, the object *seems* to approach; this seeming to approach being the result of an unconscious process of reasoning. The mind, on the basis of tactile experience, interprets any given object as being of a known or ascertained size: if it comes to look larger, it is inferred that it has come nearer.

As to single vision with two eyes, the figure shows that if L and R represent the two eyes and SS a line (the 'horopter') drawn through the point A where the optic axes LA and RA intersect, and



parallel to a line joining the two eyes L and R, the point A is seen in corresponding points of the two eyes, axially situated; but two points *r* and *l* may be so placed, either in the plane of the horopter or outside it, that the two eyes together perceive them as one point B. This point is in fig. 1 nearer to the eye and in fig. 2 farther from the eye than the horopter SS itself. If now, in fig. 1, a diagram be made representing *l* and A and another representing *r* and A; and if the former be laid before the left eye and the latter before the right eye, the two optic axes being made to converge so that the image of A is formed in corresponding points in the two eyes, the points *l* and *r* will appear to blend into one, situated nearer the eye than A or farther from it; and this explains the action of the stereoscope, and also the 'pseudoscopic' effect produced when the pictures are reversed (see STEREOSCOPE). The impression of relief is thus produced by rays falling on non-corresponding points of the retina. If the retinal pictures are identical, the optic axes being convergent, the image is seen in the plane of the horopter: thus if a small-patterned wall-paper be looked at and then the eyes made to squint slightly, the wall-paper will appear to approach, for the horopter (SS, figs. 1 and 2) is now nearer to the eye, and *vice versâ*. Professor S. P. Langley estimates that the amount of Energy which is necessary, in the form of incident Light, to produce vision ranges from $\frac{1}{10^{10}}$ erg (= 1·13562,700,000th foot-pound) for the extreme red to $\frac{1}{10^{11}}$ erg for the green of the spectrum.

The subject of vision is a very large one, and the reader may be referred to Von Helmholtz's *Physiological Optics*, part iii. (German or French editions), which contains copious bibliographical references; and also to Berkeley's *Theory of Vision*; Wheatstone, *On the Physiology of Vision*; Samuel Bailey's Review of Berkeley's *Theory of Vision*, and a review of this work by J. S. Mill, *Dissertations and Discussions*; T. K. Abbott's *Sight and Touch*; Von Helmholtz's *Popular Lectures*; and Sully 'On Vision,' *Mind*, Nos. ix. and x.

Visions. See APPARITIONS, SPIRITUALISM, THEOSOPHY.

Visitation. The Festival of the Visitation, to commemorate the visit of the Virgin Mary to her cousin Elizabeth, is observed by Roman Catholics on the 2d July. For the Order of the Visitation, see FRANCIS OF SALES, and SACRED HEART OF JESUS. Visitations are amongst the duties of archbishops, bishops, and archdeacons. For Visitations by Heralds, see HERALDRY, Vol. V. p. 660.

Vison. See MINK.

Visp (or VISPACH; Fr. *Viège*), a village of 900 inhabitants in the Canton de Vaud, at the opening of the Visp valley to the Rhine, 42 miles E. of Martigny, on the railway which in 1891 was continued to Zermatt.

Visscher, CORNELIS (1629–58), a Dutch copperplate engraver, famous for his portraits and for engravings after Guido Reni, Brouwer, and Ostade. —His brother Jan (1636–92) was also distinguished in the same branch of the profession.

Vis'tula (Lat.; Polish, transliterated, *Vistla*; Ger. *Weichsel*), the great river of Poland when it was yet a kingdom, rises in Austrian Silesia, near the frontier of Galicia, at the height of 3600 feet above sea-level, amongst the outliers of the Carpathians. Formed by three head-waters, the White, the Little, and the Black Vistulas, the Vistula flows north-west a few miles to the village of Wisla, where its course is marked by a fall of 180 feet, and thence to the town of Schwarzwasser, where it leaves the mountains. At this point the Vistula turns north-east, and flows in this direction past Cracow, to its confluence with the San, 10 miles below Sandomierz, forming throughout nearly the whole of this part of its course the boundary between Galicia and Russian Poland. From its confluence with the San the river turns to the north, enters Poland, which it traverses in a general north-west direction, passing

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Warsaw, Plock, and Lipno. Leaving Poland, it enters Prussia near Thorn, flowing west-north-west to its junction with the Bomberger Canal, thence north-north-east past Kulm and Graudenz, where it turns north, and flows in that direction to its embouchure in the Baltic Sea, which it enters by several mouths. About 10 miles below Marienwerder it throws off an arm called the Nogat, which, taking a north-east direction, and after flowing 32 miles, enters the Frisches Haff by about twenty mouths. The main stream continues to flow north for 115 miles, dividing, however, into two branches, one of which flows into the Frisches Haff, the other into the Gulf of Danzig at Weichselmunde, 3 miles below Danzig. The Vistula receives from the right the Bug, the San, the Dunajec, and the Wieprz; from the left, the Pillza and Brahe. The Vistula is 650 miles in entire length. It becomes navigable at Cracow for small vessels, and for large vessels at the confluence of the San; and its lower course, which is carefully and laboriously dredged and regulated, is the great outlet of the commerce of the Polish provinces.

Vis Viva, a term introduced by Leibnitz and still occasionally found in modern treatises on dynamics. It is measured by the product of the mass of the moving body into the square of its speed, and is therefore twice the quantity now known as the Kinetic Energy (see ENERGY).

Viswamitra. See VEDA.

Vit, VINCENZO DE, distinguished Latinist and editor of the enlarged edition of Forcellini's *Lexicon Totius Latinitatis* (6 vols. quarto, Prato, 1858–79), a Paduan by birth (1811) and an ecclesiastic by profession, was a canon of Rovigo, and town-librarian, when in 1850 he joined the brotherhood of Rosmini, to whom he dedicated the *Lexicon*. On his jubilee in 1888 Leo XIII. sent him a gold medal. His minor writings on history, archæology, and philology have been collected in a uniform edition published at Milan and Florence. The 11th vol. (1892) is entitled *Domodossola; or the Roman Province of the Alpes Atrectianæ*, the existence of which he maintains against Mommsen. His greatest original work is the *Onomasticon*, containing all proper names down to the 5th century. Thirty-six years' labour had just brought him to the end of O, closing the fourth volume, when he died 17th August 1892. He also left ready for the press a supplemental seventh volume to Forcellini, giving in 1000 pages in double columns all the words in recently discovered inscriptions or codices.

Vitaceæ, also called AMPELIDEÆ, a natural order of polypetalous plants, of which the common vine may be regarded as the type. About 440 species are known, natives of warm and temperate climates, all shrubs, mostly climbing; with simple or compound leaves, with or without stipules, the lower leaves opposite, the upper ones alternate; the flower-stalks racemose, opposite to the leaves, sometimes (as in the vine), by abortion, changing into tendrils. The only plant of the order of much value, in an economical point of view, is the Vine (q.v.); but species of the genus Cissus and of Ampelopsis are sometimes planted for ornament. See VIRGINIA CREEPER.

Vitality. See LIFE. Vitalism is the doctrine that attributed the functions of vitality, of the living organism, to a vital force distinct from the chemical and other purely physical forces that act in and on it.

Vital Statistics, an important division of the great subject of Statistics (q.v.), which deals with the facts and problems concerning population in one or more countries. The absolute numbers of the people at various dates, the rate of increase, density, proportion of sexes, marriage-rate, ages at marriage, birth-rate, illegitimacy, death-rate, mortality at different ages, mortality in different occupations, causes of death, accidents, emigration and immigration, religions of the people, and many other subjects fall within this head. These various points are dealt with in many articles throughout this work, as in the relevant sections in the articles on Great Britain and on the other countries, and in the articles named at STATISTICS. See also works there cited; books on vital statistics by Neison, Farr, and Newsholme; and the census reports and the statistical returns of the various countries.

Vitebsk, capital of a government in the west of Russia, on the Western Dwina, 380 miles S. of St Petersburg by rail. It trades in grain, flax, sugar, and timber with Riga. Pop. 54,676, very many of them Jews. The government has an area (17,440 sq. m.) larger than Switzerland.

Vitellius, AULUS, Roman emperor for nearly the whole of the year 69 A.D., was born in 15 A.D., and through flattery and his congenial vices was successively a favourite of Tiberius, Caligula, Claudius, and Nero. Appointed by Galba to the command of the legions on the Lower Rhine, he allowed himself to be by them proclaimed emperor at Colonia Agrippinensis (*Cologne*) in the beginning of 69. He sent beforehand into Italy his generals, Fabius Valens and Cæcina, who closed the reign of Otho by the victory of Bedriacum. During his reign Vitellius gave himself up without restraint to beastly gluttony, spending, it is said, no less than nine hundred millions of sesterces (£7,000,000). Meantime Vespasian was proclaimed in Alexandria, and the legions of Illyricum under Antonius Primus declared for him. Cæcina betrayed his master, and Primus defeated the armies of Vitellius in two battles, then marched on the city. Vitellius was dragged through the streets and murdered, 21st or 22d December 69.

Viterbo, a city in a volcanic region on the slopes of Monte Cimino, 50 miles NW. of Rome by rail, with an ancient cathedral, many fine palazzi (in the bishop's palace several elections of popes took place), an unusual number of beautiful fountains, some manufactures and a pop. of 15,279. See ETRURIA.

Chaste Tree (*Vitex Agnus castus*).

Vitex, a genus of trees or shrubs of the natural order Verbenaceæ, the fruit a drupe, with a four-celled stone. *V. Agnus castus*, the Chaste Tree, a native of the countries around the Mediterranean, is downy, with digitate leaves white on the back, and has an acrid fruit, the seeds of which have been used as an external application in cases of colic. It derives its name from the practice of Grecian matrons to strew their couches with its leaves, especially during the sacred rites of Ceres, in order to banish impure thoughts; for which

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purpose a syrup, made of its fruit, was also used in convents in the south of Europe. The shrub is hardy in the south of England. Of the seventy-five species of vitex some yield excellent timber.

Viti Islands. See FIJI.

Vitré, an ancient town of Brittany, in the dept. of Ille-et-Vilaine, on the Vilaine, 24 miles E. of Rennes by rail. It is still surrounded with ramparts, and contains the ruined castle of the Tremouilles. Rochers, the residence of Madame de Sévigné, is 3½ miles south. Manufactures of cloth and hats are carried on. Pop. 9207.

Vitrified Forts. See HILL-FORTS.

Vitrina, a genus of land molluscs forming a connecting link between the slugs and true snails. But one species is known in Britain, *V. pellucida*, the glass-snail. It is exceedingly hardy, and has often been observed crawling upon the snow.

Vitringa, CAMPEGIUS, divine and commentator, was born at Leeuwarden in 1659, studied at Franeker and Leyden, and became professor at Franeker, first of Oriental Languages and then of Theology. The most eminent pupil of Cocceius, he died 31st March 1722, leaving innumerable commentaries on Scripture and other erudite works (mostly in Latin), of which his commentary on Isaiah (1714–20) and the *De Synagoga Vetere* (1696) were the most important.

Vitriol (derived from the Latin *vitrum*, 'glass') is a term which the early chemists applied to glass-like salts, distinguishing them by their colours into blue vitriol, green vitriol, and white vitriol. *Blue vitriol* is sulphate of copper (see COPPER). *Green vitriol* is the popular name for sulphate of iron (see IRON). For *white vitriol*, see ZINC. *Oil of vitriol*, or simply *vitriol*, is a name popularly given to commercial Sulphuric Acid (q.v.), the former in consequence of its oily appearance, and of its being formerly obtained from green vitriol. *Elixir of vitriol* is the old name for the aromatic sulphuric acid of the Pharmacopœia.

Vitrophyre, a porphyritic variety of volcanic glass. See OBSIDIAN, PITCHSTONE.

Vitruvius Pollio, a North Italian, possibly from Verona, educated under Julius, and employed by Augustus Cæsar as a civil architect and military engineer. To his patroness Octavia, sister of Augustus, he owed the competence which enabled him to write at leisure his ten books *De Architectura*. These, dedicated to Augustus, treat (1) of the principles of architecture; (2) of building materials; (3) of temples; (4) of columnar arrangement; (5) of public edifices; (6) of urban and rural architecture; (7) of house-decoration. The 8th book deals with water-supply and aqueducts; the 9th with gnomonics; and the 10th and last with mechanics. Borrowing largely from Greek authorities, he supplemented these by matter of his own, and illustrated the whole with diagrams, unfortunately lost. His professional far exceeded his literary skill—his style being bald, clumsy, and often obscure. His work, however, is the one Latin treatise on architecture, and has had many editors, commentators, and interpreters. The best text is that of Rose and Müller-Strübing (1867), with a good index by Nohl (1876); while his most satisfactory expositor is the mediæval Italian Fra Giocondo (1435–1515), now unearthed from unaccountable neglect. Reference should also be made to Mr J. H. Middleton's lectures.

Vitry-le-François, a town of France, and fortress of the fourth class, in the dept. of Marne, on the river Marne, 127 miles E. by S. of Paris by rail. The first site was at Vitry-en-Perthois; but it was burned by Charles V. in 1544, and François I. rebuilt the town on its present site. Pop. 7984.

Vittoria (*Vitoria*), capital of the Basque province of Alava, stands on an elevation, 120 miles NE. of Valladolid by rail. The cathedral dates from the 12th century. Paper, cabinet-work, carriages, and earthenware are manufactured. Pop. (1878) 25,039; (1887) 27,660. Vittoria will be ever memorable for the decisive and important victory which was here gained by Wellington over the French under Joseph Bonaparte and Jourdan, June 21, 1813.

Vitus, ST, a reputed martyr under Diocletian, the son of a Sicilian pagan, but converted by his nurse Crescentia and her husband Modestus. All three perished together, in Lucania or at Rome, the festival falling on June 15th. The relics of St Vitus are preserved at Corbey and at Prague. He is invoked against sudden death, hydrophobia, prolonged sleep, and the complaint commonly called the Chorea or Dance of St Vitus; some authorities make him also the patron of comedians and dancers. It is said that in Germany in the 17th century it was a popular belief that good health for a year could be bought by bringing gifts to his image and dancing before it on his festival—a practice especially in vogue at his chapels at Ulm and Ravensberg. Hence we are asked to believe that the Dance of St Vitus, becoming a familiar phrase, was confounded with the nervous disorder.

Vivandière, in the French and some other continental armies, a female attendant in a regiment, who sells spirits and other comforts, ministers to the sick, marches with the corps, and contrives to be a universal favourite. From the Algerian campaigns onward the vivandière wore a modified (short-petticoated) form of the regimental uniform; but this arrangement has been forbidden by government. Familiar from Ouida's *Under Two Flags*, the *Daughter of the Regiment*, &c., the vivandière has been largely superseded in her functions by the *Cantinier* (see CANTEEN).

Viverridæ. See CARNIVORA.

Vives, JUAN LUIS (generally known as Ludovicus Vives), humanist, was born at Valencia in Spain, 6th March 1492. He studied philosophy at Paris, but, disgusted with the empty quibblings of scholasticism, turned to the study of the classics at Louvain, where he taught and wrote against scholasticism. Thence he was summoned (1523) to England to be the tutor of the Princess Mary, and he taught at Oxford. He was imprisoned for opposing the king's divorce, and after 1528 lived mostly at Bruges, where he died, 6th May 1540. Amongst his works are *Satellitium Animi* (1524; new ed. Vienna, 1884), *De Disciplinis*, *De Ratione Discendi*, *Linguæ Latinæ Exercitatio* (1539; very often reprinted), an important edition of Aristotle's *De Anima*, works on Virgil's *Bucolics*, on the support of the poor, and in defence of Christianity. He was suspected of Protestant tendencies.

Vivisection, a term employed to designate operations or painful experiments performed on living animals, with the view of increasing our physiological knowledge. The term, properly limited to cutting operations, is now regularly applied to any physiological experimenting on animals, as by ligature, exhibition of poisons, inoculation with disease, subjection to special conditions of atmospheric pressure, temperature, food, &c. Experiments on living animals were made by Galen and the Alexandrian school, and were long unhesitatingly regarded as a valuable source of physiological and pathological knowledge, and as an important means of advancement for the surgical art. But since attention was called in the 19th century to the needlessly cruel and frequent experiments of Magendie and other continental physiologists a controversy has arisen, the outcome of which is a wide-spread belief, especially

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amongst the non-medical and non-scientific public, that vivisection is in every shape and form odious and cruel, and that in no case should it be practised or sanctioned. It is contended even that vivisection has not been so advantageous to science as is commonly represented; some affirm that it has served no good purpose that could not be arrived at without it; many hold that, even were it proved of unquestionable benefit, it is illegitimate and wrong to subject the lower animals to pain for our purposes; furthermore, it is taught, vivisection carried on for whatever purpose, and under whatever conditions, can only serve to brutalise the performer and all spectators of such cruelty.

The replies are not less numerous and zealous than the impeachments. It is admitted that painful vivisection should not be performed in order to illustrate facts already known, or to give surgical dexterity. Most physiologists are agreed that it is desirable to practise vivisection only when knowledge may be thus obtained that is otherwise unattainable; that great care should be taken not to injure sensitive nerves; that the operation should, whenever possible, be given under anæsthetics; and that after vivisection the animal, if seriously injured, should be quickly put to death. It is pointed out that the bulk of anti-vivisectionists are quite content that animals should be killed for food, or as vermin; many have no scruples about shooting game or fishing, though much pain is thus inflicted.

Amongst valuable results obtained from vivisection it is usual to mention our knowledge of the circulation of the blood, the functions of the nervous system, of the lacteals, of the liver, the processes of digestion, the meaning of the heart-sounds in heart diseases, the practicability of the transfusion of blood, the pathology of tapeworm and *trichina spiralis*, and the knowledge which enables surgical and medical skill to deal with those suffering from diabetes and some forms of epilepsy, to use electro-therapeutics, and to relieve suffering of many different kinds. At the Royal Commission of 1876 on this subject, out of forty-seven skilled witnesses only two were of opinion that experiments are not necessary for original research. But to relieve wide-spread anxiety parliament in 1876 gave its assent to a bill to amend the law relating to cruelty to animals, the purpose of which was the restriction, or better regulation, of vivisection. The act requires that every one performing a painful experiment upon a living animal (which must be with a view of advancing physiological knowledge, or knowledge which will be useful for saving or prolonging life, or alleviating suffering) must hold a license from the Home Secretary, and be under the supervision of inspectors appointed to see that the provisions of the act are carried out. Persons holding a conditional license are allowed to perform such experiments only in a registered place, while the same rule applies to experiments performed for the sake of instruction (which, however, are permitted only under certain stringent limitations). Special protection is afforded to horses, asses, mules, dogs, and cats. The act does not apply to invertebrate animals. In 1891 the number of licensed places was 59, of licenses 153, and of experiments 2661 (1406 being inoculations or hypodermic injections).

Agitation for the total prohibition of vivisection has nevertheless been maintained in Great Britain by not a few zealous persons, and several active societies for the purpose, with numerous branches, conduct a vigorous propaganda. The Vivisection Act is strongly objected to on the ground that it legalises cruelty under specific conditions, and that the inspection under its provisions is inevitably unsatisfactory, the inspectors being, as a rule, in sympathy with the experimenters. It is impossible fully to state the case for and against vivisection here; reference must be made to the copious literature of the subject. Both the British Medical Congress and the International Medical Congress pronounced unanimously in favour of vivisection, properly regulated, and insisted on its value both to physiological science and to medical and surgical practice.

See the arguments for and against Pasteur's method of inoculation in the article HYDROPHOBIA; numerous articles in the *Nineteenth Century*, *Contemporary Review*, *Fortnightly Review*, *Nature*, and the *Spectator*; against vivisection, the publications of the Victoria Street Society (including a paper by Lord Coleridge), Miss F. P. Cobbe's *Modern Rack* (1889) and other works on the subject, Nicholson's *Rights of an Animal* (1879), and Lawson Tait's *Uselessness of Vivisection* (1883); in favour of properly regulated vivisection, most handbooks of physiology, Hermann's *Vivisection Popularly Discussed* (trans. 1877), Dr G. Gore's *Utility and Morality of Vivisection* (1884), and *Physiological Cruelty, or Fact versus Fancy*, by Philanthropist (1883).

Vizeu, a city of Portugal, in the province of Beira, stands on a lofty and fruitful plain, 50 miles NE. of Coimbra, with a fine cathedral and some Roman and Moorish remains. Pop. 6956.

Vizier, or VEZIR (Arabic *wazir*, the 'bearer of a burden'), the title of various high functionaries in the Ottoman empire and other Mohammedan states, was first bestowed on the chief-minister of the first Abbaside calif, in the 8th century, and for some centuries denoted the president of the council of ministers and principal adviser of the calif, and consequently the second person in authority of the Moslem empire. The various princes who founded dynasties under the califate also had their viziers, and the dignity and authority of the office varied considerably, till sometimes it came to represent little more than a clerkship. A famous family of viziers was that of the Barmecides under the early Abbaside califs, and another was that of the Kinprilis under the Ottoman sultans. The dignity of vizier was introduced among the Turks during the reign of their second sultan, Orkhan, and the title was at first confined to the sultan's prime-minister; but the prime-minister's title was afterwards changed into *vezir-azam*, 'grand vizier,' and the title of vizier was given to all the Turkish ministers of state, as well as to provincial governors. In 1878 the title of grand vizier was abolished, that of President of the Council of Ministers being substituted. This dignitary, whether under the old name or the new, is, after the sultan, the most important personage of the empire, and is the head of the administration; but he is subject as formerly to more serious control from the intrigues of the palace than from the new 'constitution.'

Vlaardingen, a town of Holland, 5 miles W. of Rotterdam, near the New Maas, with a shipping trade and large herring-fleet. Pop. 12,059.

Vladikavkaz, capital of the Terek province of Cis-caucasia, at the foot of the main Caucasus chain, and at the opening of the valley of the Terek. It is the terminus in this direction of the Russian railway system, and is on the only carriage road through the Dariel pass to Tiflis and the south of the mountains. There is a fortress here, and considerable trade. The population has rapidly increased from 8000 to 33,981 in 1886 (Cossacks, Armenians, and a motley representation of various Asiatic races).

Vladimir, capital of a government in the heart of Russia, stands on the left bank of the Kliasma, 120 miles NE. of Moscow by rail. It was founded in the 12th century, was the seat of a principality (see RUSSIA), and in the 14th century practically capital of Russia. It contains many historical

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remains, as the Kreml, the 'Golden Gate,' built in 1158, ruins of old fortifications, and many ancient churches. It is now a decayed provincial town. Pop. 18,305. The government has an area (18,864 sq. m.) as large as the kingdom of Servia; pop. 1,403,172.

Vladimir. See RUSSIA, p. 40; and for VLADIMIR MONOMACHUS, p. 42.

Vladivostok, a small town near the farthest frontier of Asiatic Russia, near the north limit of Corea, on Peter the Great Bay in the Sea of Japan. It has one of the finest harbours in the world, is a naval station, has an arsenal, and is the terminus of the overland part of the telegraph by Irkutsk and Kiachta. In 1888 it was made the capital of the Amur province, and it had already superseded Nikolaevsk as a naval station. Founded in 1861, it had in 1885 a pop. of 13,050.

Vlissingen. See FLUSHING.

Vodena, a town of Turkey, on a mountain-slope, 46 miles WNW. of Saloniki. Pop. 15,000.

Voghe'ra, a town of Northern Italy, 16 miles by rail SW. of Pavia, on the Staffora (with a handsome bridge). Its market-place is surrounded with arcades, and it contains a technical school, manufactures silk, cottons, woollens, farming tools, and hats, and has a busy trade in the produce of the fertile country around. The ancient *Iria Augusta*, on the Via Emilia, it was one of the earliest Italian towns to introduce printing. The walls raised by Galeazzo Visconti in 1372 are now shaded promenades. Pop. 12,794.

Vogler, GEORG JOSEPH, composer, usually styled the Abbé (Browning's Abt) Vogler, was born at Würzburg, June 15, 1749, the son of a violin-maker. A musician from his cradle, he studied at Bamberg, Mannheim, Bologna, and Padua, was ordained priest at Rome in 1773, and made Knight of the Golden Spur, and protonotary and chamberlain to the pope. Returning to Mannheim, he established there his first school of music; his second was that at Stockholm, where in 1786 he had been appointed Kapellmeister. After years of wandering and brilliant successes as a player on his 'orchestrion' at London and half over Europe, he settled as honoured Kapellmeister at Darmstadt, and opened his third school, the chief pupils of which were Gänsbacher, Weber, and Meyerbeer. Here Vogler died, May 6, 1814. His compositions are now forgotten, still more so his new theories of music, and indeed many, with Mozart, count him but a charlatan. His name best survives in Robert Browning's poem in the *Dramatis Personæ* (1864), a splendid imaginative expression of the function of the art of music. See the study by Schafhäutl (Augsb. 1887).

Vogt, CARL, naturalist, was born in Giessen, 5th July 1817, and had his education there and at Bern, two of his teachers being Liebig and Agassiz. In 1847 he became professor of Zoology at Giessen, but soon lost the post from his extreme politics, whereupon (1852) he accepted the chair of Geology at Geneva. He headed an expedition to the North Cape in 1861. Chosen in 1878 a member of the Swiss National Assembly, he showed himself a thorough-going Materialist, and a champion of Darwinism in its fullest consequences. Of his many books may here be named the *Lectures on Man* (Anthropological Society, 1864), *Zoologische Briefe* (1851), *Altes und Neues aus dem Tier- und Menschenleben* (1859).

Voice (Lat. *vox*), an audible sound (see SOUND) produced by the larynx (see LARYNX), and more or less affected by its passage outwards through the mouth and other cavities. When so modified in particular ways it becomes speech or song. The main differences between these two latter are that speech is more limited in compass or pitch, that it is less sustained in respect of pitch, and is not confined to the notes of a musical scale, that it is associated with a less clear or open passage for the breath, and that it presents certain utterances (consonantal, aspirate, guttural, &c.) which have not a purely musical character. The larynx is the organ by which the so-called vocal sounds (or primary elements of speech) are produced; and it was in former times keenly debated to which class of musical instruments the larynx might best be compared. As Dr Witkowski says (*Mechanism of Voice, Speech, and Taste*, Lennox-Browne's translation): 'Galien compares it to a flute, Majendie to a hautboy, Despiney to a trombone, Diday to a hunting-horn, Savart to a bird-catcher's call, Biot to an organ-pipe, Malgaigne to the little instrument used by the exhibitors of Punch, and Ferrein to a spinet or harpsichord. The last named compared the lips of the glottis to the strings of a violin; hence was given the name *Vocal Cords*, which they still retain. The current of air was the bow, the exertion of the chest and lungs the hand which carried the bow, the thyroid cartilages the *points d'appui*, the arytenoids the pegs, and lastly, the muscles inserted in them the power which tensed or relaxed the cords.' But the vocal cords are very different in their structure from strings, and no string so short as the vocal cords are could produce a clear bass note. They more resemble in their action a pair of reeds; not such an instrument as a clarionet, in which the vibrations of the column of air of any determinate length overpower the single reed, and compel it to vibrate only in rhythm with themselves, but such an instrument as may be constructed with two strips of india-rubber laid across the mouth of a wide tube so as to present a mere chink between them. But the larynx contains within itself a great power of adjustment, such as is possessed by no musical instrument; the tension of the vocal cords can be varied; the vibrating portion of the vocal cords can be shortened; the distance between them can be varied; their form can be altered, as by blunting their free edges or by flattening their whole structure; and they can be prevented from vibrating in their whole breadth, the vibrations being then confined to their margins merely: and these adjustments may be combined so as to suit different pressures of air from the lungs. Further, above and below this primary sounding apparatus there are adjustable cavities, which act as resonators, and thus (see SOUND) affect the quality of the sound produced. The actual action of the larynx as a sounding instrument has only been clear since Garcia introduced (1855) the laryngoscope (see LARYNX) as a means of observing what went on during actual vocalisation; and a flood of light has been thrown on the subject by the researches of Czermak, Merkel, Madame Seiler, and Behnke. The *crico-thyroid* muscles pull the thyroid cartilage and the cricoid cartilage together; the vocal cords are thus tightened: and the *posterior crico-arytenoid* muscles aid in this. The *thyro-arytenoid* muscles relax the vocal cords, and twist the arytenoid cartilages round so as to make their attachments to the vocal cords come over towards one another instead of lying at some distance from the middle line; and they can also so act as to press portions of the vocal cords together, and thus shorten the free vibrating edges; and further, they can squeeze their own inner portions thin, and thus flatten and thin the vibrating part of the vocal cords. The *posterior crico-arytenoid* muscles, in addition to aiding in tightening the vocal cords, twist the arytenoid cartilages so as to widen the back part of the chink between the vocal cords;

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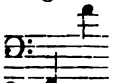
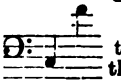
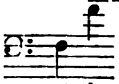
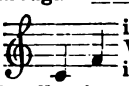
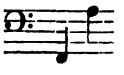
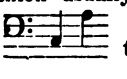
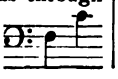
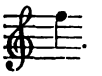
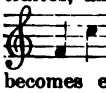
while the *lateral crico-arytenoids* as well as the *thyro-arytenoids* perform the reverse operation, and thus narrow the chink, and are assisted in this by the *arytenoideus* muscle, which directly pulls the arytenoid cartilages together. These muscles in combination effect the various adjustments above spoken of. In a state of rest the glottis lies open, and respiration is unimpeded; in deep breathing the chink is still wider, but as soon as we wish to utter a note the two arytenoid cartilages rapidly approach one another, and the glottis-chink is narrowed. At the same time the superior or false vocal cords approach, but never touch one another. If the vocal cords meet one another before the current of air flows to produce the tone, there is a disagreeable jerk or click at the commencement of the note; if the air flows before the vocal cords have sufficiently approximated, there is an aspirate, and the 'attack' or beginnfng of the note is uncertain; the two actions ought to coincide in time, and then the 'attack' is clear and precise, for the vocal cords are brought to the right place for vibration at the very time when the air begins to tend to set them in motion.

In different larynxes much depends on the relative sizes of the vocal cords; thus a man with a bass voice has longer vocal cords than a child or a woman; but as between basses and tenors, tenors and contraltos, or contraltos and sopranos, the higher voice may sometimes appear to have the longer vocal cord: on the other hand, slenderness of structure makes up for greater length, and when the vocal cords are long and slender, the voice is 'flexible,' for the cords readily enter into vibration. Further, a narrow larynx is conducive to high pitch, and so is not only the size but also the form of the female larynx, in which the upper part, above the false vocal cords, and between them and the hyoid bone, is comparatively flat. In children the larynx is small, and the voice high-pitched; but the larynx grows very rapidly at puberty; and as its different parts do not then grow with proportionate rapidity, the muscular control is uncertain, and the voice, especially in boys, breaks.

In one and the same larynx different parts or regions of the scale are produced by different laryngeal mechanism: and those notes of the scale which are produced by the same mechanism (Behnke) are said to be produced in the same *register*. The registers of the voice have given rise to a great deal of discussion, most of which appears to have arisen from independent attempts to express sensations in words. It appears, however, from the laryngoscopical evidence (for which see Lennox-Browne and Behnke, *Voice, Song, and Speech*) that the whole mechanisms can be divided into three groups, or 'thick,' 'thin,' and 'small' registers, as Mr Curwen happily named them before the laryngoscopical evidence had come to hand. In the first the vocal cords vibrate as thick masses; in the second they vibrate in their thin edges only; in the third the vibrating chink of the glottis is much reduced in length. The lowest or thick register usually extends through the interval  in bass voices, through in tenors, through in contraltos, and through in sopranos. Very curiously, it thus terminates at the same note in all voices. This register is usually divided into lower thick and upper thick. The 'lower thick' usually extends through in basses,  in tenors,  in contraltos, in sopranos; and in this division the vocal cords are very bulky and thick, the *posterior* portions of the arytenoid cartilages are closely approximated, but the chink is wide and elliptical in the lower notes, less so in the upper; and the false vocal cords are far apart. In the 'upper thick' the arytenoid cartilages have rotated into complete contact with one another, so as to shorten the vibrating portion of the vocal cords: the thyroid bends down on the cricoid cartilage: the vocal cords are being stretched so that the chink between them is very narrow; and the epiglottis rises as the pitch rises. When the upper limit of this register has been reached the strain on the parts is extreme. Beyond this register comes the thin (the 'male falsetto'), which is in the female and does not go beyond

the normal mechanism for notes between and .

The strain of the chest-notes, or thick register, is now relieved: the thyroid cartilage returns: the vocal cords lie still and somewhat slack at first, and the vibration is confined to their membranous edges: they are separated by a narrow chink which is at first longer than before: as the pitch rises the crico-thyroid muscle goes on acting until the thyroid and cricoid cartilages are again in apposition: and this lasts, in tenors, contraltos, and sopranos alike, through the interval  When the note C is reached still higher notes are attained by a gradual shortening of the vocal chink, which becomes elliptical, and is gradually reduced in size. But beyond F or F♯ the soprano voice has still another register, the 'small' register. In this only the front part of the vocal cords vibrates; the vocal chink is reduced to a small aperture in front, which contracts as the pitch rises, while the hinder portions of the vocal cords are pressed tightly together. These different mechanisms produce perceptibly different qualities of tone; and the art of the vocalist is, largely, to use higher registers for lower notes, so that he may be able to strike the same note in more than one way, and thus have at command the means of smoothly passing from one part of the scale to another without *jödelling* or appearing to sing with different voices on different notes. One means of doing this in some cases is by the use of a *voix mixte*, in which the laryngeal position of the lower thick register is associated with the vibrating mechanism of the lower thin. For voice-production and voice-cultivation reference must be made to the special manuals mentioned below.

The resonating cavities and appurtenances connected with the larynx form a complex system consisting of the pockets lying between the true and false vocal cords (the effect of which cannot be very great, but which must be affected by the position of the false vocal cords), the vestibule of the larynx, the epiglottis (which directs the sound-waves towards different parts of the resonating system, and affects the colour or *timbre* of the tone produced), the pharyngeal cavity, the nasal cavity, and the mouth. When the sound-waves find a clear air-way over the tongue and under the soft palate the tone is clear; when the soft palate hangs down, so that some of the air escapes by the nose, the tone is nasal; when the tongue does not lie flat and out of the way the tone is throaty and strained; when the lips obstruct the sound-waves the tone becomes muffled. The quality of tone is also very much affected by the control which the speaker or singer may have over the breath: he should have his lungs well filled with air by abdominal respiration, and be able to attack the

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sound clearly with a minimum expenditure of breath, and direct the sound-waves well forward, keeping the resonating cavities large and clear; under these circumstances the voice carries through a maximum distance with a given effort, especially if, in the case of a speaker, he raises not the pitch of his voice, but its loudness when the occasion requires it: and under such conditions the pressure of air in the windpipe can be raised to a considerable height, and the voice rendered clear and telling without exhausting exertion.

Modifications in the form of the resonating cavities result, by resonance, in those modifications of *timbre* (or the relative predominance of particular harmonics of the fundamental note; see SOUND) which we call *vowels*. In pronouncing *u* (= *oo* or Italian *u*) we round the lips and draw down the tongue, so that the cavity of the mouth assumes the form of a bottle without a neck; if the lips be opened somewhat wider and the tongue be somewhat raised, we hear *o*; if the lips be wide open and the tongue in its natural flat position, we hear *a*; if the lips be fairly open and the back of the tongue raised towards the palate, the larynx being raised at the same time, the vowel produced is *e*; and if we raise the tongue still higher and narrow the lips, we hear *i*. Each of these resonance-chamber forms has its own dimensions and its own resonance-pitch; and of these *u* has the lowest pitch, as may be heard by whispering the vowels, or by means of a series of tuning-forks successively reinforced by the cavity of the mouth as a resonator; for which reason it is easier to sing *u* and *o* on low than on high notes. Diphthongs are produced by continuing the laryngeal sound during the transition from one vowel-mouth-form to another. Consonants are produced by various interruptions, total or partial, of the outflowing stream of air. If the air be completely stopped by the lips and soft palate, we have *p* when the obstruction is suddenly removed; the same action, accompanied by a certain continued sound in the larynx, and a heavier air-pressure within the mouth, gives *b*; if the air be checked by the lips, but not by the soft palate, so that it passes through the nose alone, we have *m*; if it be checked by the soft palate and by bringing the point of the tongue to the front of the palate, or to the gums, we have *t*; the same with continued laryngeal sound and greater air pressure gives *d*; the action for *d*, modified by allowing a little air to escape over the soft palate through the nose, gives *n*; if the air be checked by the soft palate and by bringing the middle or back of the tongue to the arch of the palate, we have (silent) *k* and (if there be laryngeal sound) *g*; the latter, but with the nasal passage open, gives *ng*. In other cases a continuous stream of air is made to escape under some pressure past an obstacle, and thus to sibilate; if it be driven through a narrow chink between the upper front teeth and the lower lip, the larynx being silent and no air escaping through the nose, we have *f*; the same, with greater air-pressure and a laryngeal sound, gives *v*; the true aspirated *p* and *b* (air driven with or without voice through a very narrow and small lip-chink) do not exist in English, but the latter fairly represents the German *w* in *wasser*; if the tongue be pressed tightly against or between the front teeth and air be driven through these, we have, without voice, *th* in *thin*, or with voice *th* in *then*; if in the last instance the contact be loose, we have *s* and *z* respectively; if the tongue be put in the *t* position and a little reverted, we have for tight contact *ch* and *j* (*judge*), and for loose contact *sh* and *zh* (French *juge*); if it be put in the *k* position we have for loose contact, voiceless, the Scotch *ch* in *loch*; if in the *ng* position, the Dutch *ch*, voiced, in which the soft palate vibrates, and the Welsh *ch*, voiceless. In *l* the tip of the tongue is fixed, and its sides oscillate, while a laryngeal tone is being produced; in the Welsh *ll* the position and action are the same, while a strong current of air is employed, and the larynx is silent. In *r* the tip of the tongue vibrates against the front teeth so as intermittently to shut off the air-stream, while laryngeal tone is maintained; in Welsh *rh*, as in Rhyl (Greek *ῥ*), the action is the same, with a strong current of air and larynx silent. In a 'burred' *r* (Northumberland, Parisian French, North German) the air is interrupted by vibrations of the soft palate. The aspirate *h* is produced by narrowing the air-passages, by raising the tongue and using a momentary strong current of air at the beginning of the vowel. It not unfrequently happens that there is difficulty experienced in co-ordinating the requisite movements of larynx, tongue, and mouth, which are usually automatic, and depend upon the will to attain, by imitation, a given result; in such a case a person stutters his consonants or stammers his vowels. In many such cases the respiration is not under control, and attention to this may enable the defect to be remedied.

The reader may consult Behnke's *Mechanism of the Human Voice*, or Browne and Behnke's *Voice, Song, and Speech*, and books there referred to; and also G. Holmes, *Vocal Physiology*; A. Semple, *The Voice*; Von Meyer's *Organs of Speech*; C. Lunn's *Philosophy of Voice*; Tucker's *Vocal Sounds*; A. B. Bach's *Principles of Singing*; W. H. Walshe, *Dramatic Singing Physiologically Estimated*; Sir Morell Mackenzie, *Hygiene of the Vocal Organs*; G. Durant, *Hygiene of the Voice*; John Hullah, *Cultivation of the Speaking Voice*; Holder's *Elements of Speech*; Bell's *Visible Speech*; Czermak, *On the Laryngoscope* (New Sydenham Society); Gavarret, *Phonation et Audition*; Helmholtz, *The Sensations of Tone* (Eng. trans. 1875, with bibliographies); and also the article PHONETICS, where the difference between *voiced* and *unvoiced* consonants is explained.

Voiron, a town of the French dept. Isère, 15 miles NW. of Grenoble by rail, has manufactures of linen, paper, candles, and silk. Pop. 8287.

Voiture, VINCENT, poet and letter-writer, was born at Amiens in 1598. He enjoyed the favour of the Duke of Orleans, Richelieu, and the king, and died 26th May 1648. His brilliant sonnets and *vers de société* were the delight of the salons during his lifetime, but were unpublished till after his death; his letters are as perfect in their way as those of Balzac. The first edition of his *Œuvres* appeared in 1650; later editions are those of Ubicini (1855) and Roux (1856); and Uzanne edited the letters in 1880.

Volapük, a name made up (out of *vol*, shortened from the English *world*, and *pük* for *speak*) for a universal language invented in 1879 by Johann Martin Schleyer, a Swabian pastor afterwards engaged in teaching in Constance. The vocabulary is mainly based on English (to the extent of about a third, Latin and the Romance tongues furnishing about a fourth), and the grammar is simplified to the utmost. Declension is in every case accomplished by the addition of the vowels *-a*, *-e*, and *-i* to the root for genitive, dative, and accusative respectively; *s* is the sign of the plural; and verbs are conjugated by help of *-ob*, *-om*, *-ol*, and *-of* (for I, thou, he, she, &c.). The cause was taken up in many lands, and within ten years there were grammars of Volapük prepared in twenty languages by the author (besides a mass of others), and dictionaries innumerable; while there were over twenty papers published in Volapük, and associations in most civilised lands for the practice and extension of this artificial tongue. Subsequently the progress of the system was

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checked. The most practical disciples limited their aims to making Volapük a convenience for commercial correspondence, a kind of extended international code. There are grammars in English by the inventor, by Harrison, Kerckhoffs, Kirchhoff, Sprague, &c., and dictionaries by Krause, Wood, Linderfelt, &c.

Volcanoes. A volcano is a more or less conical hill or mountain, usually truncated, and communicating with the interior of the earth by a pipe or funnel, through which issue hot vapours and gases, and frequently loose fragmentary materials and streams of molten rock. The pipe or funnel may be a vertical hole blown out by the subterranean forces through otherwise continuous and undisturbed rock-masses, or it may be an aperture upon a line of fracture or rent in the earth's crust. In the former case the volcano will usually be small; and should several such volcanoes occur in the same neighbourhood they will generally be irregularly distributed. There is reason to believe that all the larger volcanoes occur upon lines of fracture, and their linear arrangement or grouping along more or less well-defined belts harmonises with this view. All modern volcanic eruptions appear to take place from isolated points or foci, but in earlier ages molten matter seems frequently to have welled up and overflowed from long lines of fissure. These last are termed *fissure-eruptions*.

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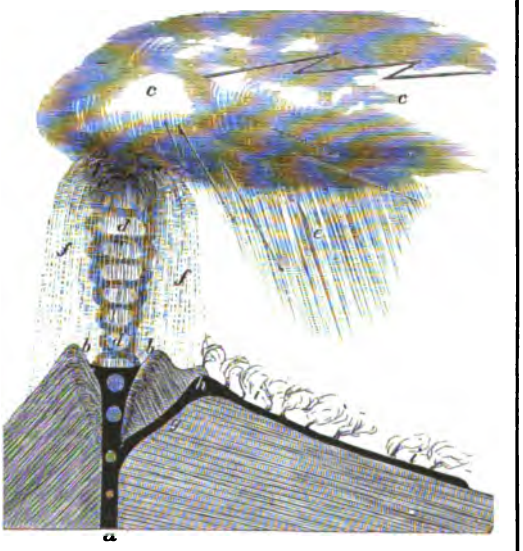
During successive eruptions the heavier portions of the loose fragmental materials—blocks, cinders, &c.—fall back within and around the vent, while lava streams from the crater, now in one direction, now in another. Thus in time a cone is built up, consisting of rudely alternate sheets of fragmental materials and lenticular flows of lava, which are all inclined outwards from the orifice of eruption. Some volcanoes are made up entirely of loose ejectamenta, but such cones are generally small, varying in size from mere monticules up to hills nearly 1000 feet in height. The stones composing volcanoes of this kind occasionally consist in large measure of the debris of the underlying rocks, such as sandstone, shale, limestone, &c., which have been ruptured, shattered, and blown into the air by exploding vapours. More usually, however, the loose materials are slags and cinders discharged from a mass of lava occupying the throat of the volcano. After a more or less prolonged ejection of slags and cinders torn from the upper surface of the lava, the latter sometimes rises into the crater and makes its escape by breaching the cone. Many of these cinder-cones are the products of only one eruption. Just as we have cinder-cones composed wholly or chiefly of fragmental materials, so we have volcanoes built up almost exclusively of lava. Some of these are of insignificant size, others are among the largest volcanoes of the world. The form assumed by a lava-cone depends chiefly upon the character of the molten rock. If the lavas be extremely viscous and tenacious they usually cool and consolidate immediately round the vent, and thus tend to form a more or less abrupt cone. Some cones of this kind have no craters—the tenacious mass having welled up and stiffened around and over the orifice so as to form a dome-shaped hill. Good examples occur in Auvergne, Bohemia, Hungary, and the Isle of Bourbon. The more liquid lavas give rise to flattened or depressed cones. The great volcanoes of Hawaii are built up almost entirely of sheets of lava which are extremely liquid at the moment of eruption, and hence readily flow away and spread themselves out as they go. By far the great majority of volcanoes, however, are composite in character—i.e. they rebuilt up partly of lava and partly of fragmental materials—sometimes the one and sometimes the other predominating. Etna and Vesuvius are excellent examples of composite cones.

While some volcanoes occur upon the ridges of vast mountain-ranges, others are met with at much lower levels. Many have commenced their eruptions upon the bed of the sea, such as Etna and Vesuvius, which were in their younger days submarine volcanoes, and the same is the case with the vast cones of the Sandwich Islands. Submarine volcanoes have even come into existence in modern times. In 1796 a column of vapour was seen to rise from the North Pacific Ocean about 30 miles to the north of Unalashka. The ejected materials eventually raised the crater above the sea-level, the fiery crest of the islet thus formed illuminating the region for 10 miles around. Six years afterwards, when a few hunters landed on the new island, they found the ground in places too hot to walk upon. Repeated eruptions have since increased the dimensions of the island, until now it is several thousand feet in height, and between two and three miles in circumference.

Some volcanoes are much more active than others. A few may be said to be in a state of permanent eruption, such for example as Stromboli, which has been constantly active since the time of Homer; Izalco (in Salvador, Central America), which had no existence before 1770, has continued active ever since, and is now some 2500 feet in height. Other examples of constantly active volcanoes are those of Masaya and Amatitlan in Nicaragua, Sangay in the Andes of Quito, Cotopaxi, Sion in the Moluccas, and Tofoa in the Friendly Islands. Many volcanoes, such for example as Vesuvius, continue in a state of moderate activity for longer or shorter periods, and then become quiescent or dormant for months or, as the case may be, for centuries, when they wake up to renew their labours. The eruption that succeeds prolonged repose is usually correspondingly violent or paroxysmal. Such was the famous eruption of Vesuvius that destroyed Herculaneum and Pompeii. Similarly in our own day the terrible outburst of Krakatoa in the Straits of Sunda took place after a repose of 200 years.

The general phenomena of a paroxysmal eruption are illustrated by the accompanying diagram. The



Diagrammatic Section of Volcano.

neck or funnel of the volcano is shown at *a*, and the crater at *b*, *b*. Lava (represented as occupying

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the funnel) is highly charged with steam or water-gas and other vapours, and these, as the molten matter surges up, continually escape from its surface with violent explosions and rise in globular clouds, *d*, *d*, to a certain height, after which they dilate into a dark turbid cloud, *c*. From this cloud showers of rain, *e*, are frequently discharged. Large and small portions of the lava are shot upwards as the imprisoned vapours explode and make their escape, forming a fiery fountain of incandescent drops and fragments (*bombs*, *slags*, *cinders*), and, along with these, pieces of the rocks forming the walls of the funnel and crater are also violently discharged; the cooled bombs, slags, cinders, angular blocks, and smaller stones (*lapilli*) falling back in showers, *f*, upon the external slopes of the cone or into the crater, from which they are again and again ejected. Lightning, probably induced by the intense friction of the escaping steam, often plays round the borders of the dark cloud. The lava at last bubbles over and flows away in torrents, either from the lip of the crater or from a rent or fissure in the side of the cone. In the diagram it is represented as escaping by a lateral fissure, *g*, *h*, and streaming down the slope, while jets of steam and other vapours, *i*, escape from its surface. The outflow of lava marks the crisis of the eruption, and after a final ejection of stones and dust the volcano relapses into a quiescent state. In some paroxysmal eruptions of great violence the liquid lava is entirely blown out in the form of hot dust by one or more tremendous explosions. This appears to be the case when a considerable body of water is suddenly introduced to the heated reservoir. Such paroxysmal eruptions often result in great changes in the appearance of a volcano. The upper part of the cone disappears, and a vast yawning cauldron takes its place. This is no doubt due to the shattering of the walls of the crater by gaseous explosions, and to the undermining action of the surging lava. Much of the broken material is blown outwards, but the chief portion of the missing rock-masses has often given way and fallen into the eviscerated volcano. The cones of Etna and Vesuvius have frequently been modified in this way. Thus in 1822 the summit of the latter was reduced by 800 feet. Again, the entire summit of Papandayang in Java was blown off during a great eruption in 1772. The same appears to have been the case with Bandaisan in Japan—one of the principal peaks of which (Kobandai) was greatly reduced in height by the terrible eruption of 1888. It is estimated that 1,587,000,000 cubic yards of rock were blown from the top of the mountain and scattered over an area of 27 sq. m. The great eruption of Tarawera in New Zealand (1886) showed that both ejection and engulfment accompany paroxysmal action. Enormous quantities of material were scattered over the surrounding regions, and after the eruption there appeared in the south-western slope of Tarawera a sunken area 2000 feet long, 600 feet wide, and 250 to 800 feet deep. Many volcanoes after such prodigious action have become apparently extinct. One of the most remarkable eviscerated volcanoes of the kind is the island of Palma, one of the Canaries, from 3 to 4 geographical miles in diameter. The caldera or depressed interior is surrounded by precipices from 1500 to 2000 feet in height. These form an unbroken wall, except at the south-western end, where a deep gorge permits the passage of the torrent which drains the caldera. In not a few cases the calderas of eviscerated volcanoes are occupied by deep lakes. Examples in Europe are the Laacher See and other *maars* of the Eifel country; Albano, Nemi, Bracciano, Bolsena, Avernus, and others in Italy; Lac Paven in Auvergne; the beautiful lakes of San Miguel (Azores), &c. Similar crater-lakes are met with in many other parts of the world, such as the lake of Gustavila in Mexico, and Crater Lake in Oregon, which has a circumference of 20 miles, and is surrounded by precipitous walls rising from 1500 to 3000 feet in height. Occasionally eviscerated volcanoes are entered by the sea, when their craters appear as nearly land-locked lagoons or natural harbours. Such is the Lago del Bagno in Ischia.

Although actual extinction appears in many cases to have followed a paroxysmal eruption, yet it is well known that this is by no means a general rule. The structure of numerous volcanoes makes this sufficiently evident. Thus Vesuvius is a cone standing in the caldera of a much larger cone, which is known as Monte Somma. The latter had evidently been eviscerated at some distant prehistoric period, and the younger cone of Vesuvius dates its origin from the time of the Plinian eruption. Since that time it has continued to increase—its growth, however, having ever and anon been interrupted by paroxysmal action. Should the volcano maintain a condition of moderate activity, the time must come when it will occupy the whole of the caldera of Monte Somma, and the latter will then become obliterated under newer ejections of lava and fragmental materials. This cone-in-cone structure is conspicuous in many other volcanoes. It is seen, for example, in Tenerife, the peak rising as a great cone from a vast caldera which is surrounded by the abrupt wall-like precipices of the older cone. The volcano of Bourbon rises in like manner in the midst of an old crater-ring, 4 miles in diameter; and the Pico de Fogo, one of the Cape de Verde Islands, is another example of the same structure. The craters of volcanoes which are situated in or upon the margin of the sea are occasionally, as we have seen, converted into harbours, the water finding access by a breach in the cone. When such volcanoes wake up, a new cone or cones by-and-by appear as islets in the centre. This type of half-submerged cone-in-cone is exemplified by the Santorin Islands (Greek Archipelago), where Aspronisi and Thera are remains of a great crater-ring, in the centre of which we see the Kaimeni Islets — the product of recent eruptions. A still more perfect example of the same structure is afforded by Barren Island in the Bay of Bengal.

A volcano, as we have seen, is composed of successive sheets of erupted material, inclined outwards in all directions from the focus of eruption. This structure is eminently weak, and, subject as an active volcano is to constant vibration and frequent earthquake movements, the cone is often modified by the displacement and collapse of large rock-masses. Indirectly, however, the fracturing of the mountain is the means of strengthening the structure—for lava frequently rises in the rents and crevices that radiate outwards from the funnel, and thus forms veins and dykes which serve to brace and bind together the various parts of the volcano. In the case of volcanoes which have attained a great height it not infrequently happens that lava ceases to rise to the central crater, and is ejected through such rents and fissures lower down on the flanks of the cone or even near its base. Sometimes this seems to indicate approaching repose or even extinction. A time comes in the life of all volcanoes when they cease to erupt either lava or fragmental materials. But for a long period they continue to give out acid gases and vapour. This is called the *solfatara stage*. Eventually the last traces of volcanic heat disappear, and springs of cold water may issue from the mountain and the ground in its vicinity. Such

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springs are often highly impregnated with mineral matter, and frequently effervescent with carbonic acid. Many of the natural effervescent mineral waters of commerce come (or used to come) from regions of extinct volcanoes. Such waters, however, are now imitated—the artificial production, owing to its greater sparkle, being in more demand than the natural.

The amount of materials discharged during a volcanic eruption varies considerably, not only in different volcanoes, but in one and the same. A prodigious quantity of lava issued from Skaptar Jokul (Iceland) in 1783. It formed two main streams which flowed for distances of 40 and 50 miles respectively, and varied in thickness or depth from 600 to 1000 feet. Enormous lava-floods have likewise issued from the volcanoes of the Sandwich Islands. In prehistoric times lava seems in many cases to have issued from long vertical fissures, and deluged wide regions. Some of these inundations of lava are well seen in western North America, as in the great basalt plain of Snake River, Idaho. The basaltic plateaus of Antrim and the Inner Hebrides, of the Faroe Islands, and of Iceland are believed to be the denuded remains of successive massive-eruptions like those of Idaho. The volcanic plateaus of Abyssinia and the Deccan (Hindustan) have had a similar origin. As a rule the volcanoes which emit lava in greatest volume are comparatively quiet in their action. The lava simply rises and is poured out, the crater is depleted of its liquid contents, and the eruption ceases. This is the case with the volcanoes of Hawaii. While the lava is bubbling and boiling in the crater jets of the incandescent liquid are shot up more or less continuously, forming the so-called 'fire-fountains,' but the terrible explosions which accompany the paroxysmal eruptions of such volcanoes as Etna and Vesuvius are unknown in Hawaii. Hence in that region the cones are built up chiefly of lavas. The Javanese volcanoes are examples of the explosive type of volcano. In these loose ejectamenta predominate, and frequently no lava flows out. In Vesuvius and similar volcanoes we seem to have, as it were, a mean between the *quiet* and *explosive* types. The enormous energy displayed during an explosive eruption is shown by the heights to which stones and ashes are projected. According to Sir W. Hamilton, jets of lava mixed with stones and scoriæ were in 1779 thrown from Vesuvius to a height of 10,000 feet, giving the appearance of a column of fire. The fine ashes of Krakatoa are said to have been carried by the uprush of gas and vapours to the amazing height of 17 miles. Remarkable solar phenomena, seen in Ceylon, South Africa, and Brazil, were attributed to the presence in the upper atmosphere of this fine dust; while in Britain gloriously coloured skies before sunrise and after sunset, months after the eruption, were attributed to the same cause. In 1845 the dust from Hecla was in ten hours lying thick on Orkney and Shetland. Ashes from Consequina fell, in 1835, in Jamaica, 700 miles off; and fine dust covered the ground 30 miles south of the volcano to a depth of 10 feet. During the great eruption of Tomboro ashes and cinders were ejected sufficient to make three mountains, each equal in size to Mont Blanc, or to cover all Germany 2 feet deep. Owing to the heavy rains which so frequently accompany eruptions, destructive torrents are formed. In many cases this water is increased by that derived from melting snows, or from the bursting open of subterranean reservoirs, or the sudden emptying of crater-lakes. Sweeping down the slopes of the mountain, the water carries along coarse and fine debris, and, reaching lower levels, often flows onward for many miles, not as a mere torrent of muddy water, but as a great inundation of soft pasty mud. Such muds are termed *mud-lavas*. Mention has already been made of the acid gases, &c. which are given off during eruptions. Occasionally hydrogen and other combustible gases are present and burst into flame. But the 'flames' that seem to issue from a crater are usually the reflection of the glowing lava illuminating the clouds of vapour, scoriæ, and ashes.

Even during its period of activity a volcano is subject to excessive denudation, and becomes seamed and scored with ravines, radiating outwards from the upper part of the cone, and deepening as they proceed towards the low grounds. Long after the volcano has become quite extinct the process of denudation is continued until the mountain has become so reduced in size and altered in form that its volcanic character is apparent only to geologists. Extinct volcanoes, showing every stage in this process of decay, are met with abundantly in many parts of the world which are no longer disturbed by volcanic action. Often all that has been left is the choked-up pipe or funnel, with, it may be, some of the loose ejectamenta surrounding it, and a few portions of the old lava-flows. As examples in Scotland may be cited Arthur Seat, Largo Law, the Eildon Hills, Rubers-law, &c. These are the mere stumps or roots of what must have been volcanoes of moderate dimensions. Now and again all that remains of a volcano is the plugged neck or funnel, such as North Berwick Law, Edinburgh Castle Rock, Loudoun Hill, the Dunian, &c.

Active volcanoes are fortunately limited to particular regions of the earth, where they are distributed at intervals, and are generally arranged in a linear direction. The Pacific Ocean is bounded by an almost unbroken line of active volcanoes—the 'belt of fire.' The coast-lands of the Atlantic, on the other hand, show hardly any, and only a few appear in adjacent islands. But the Caribbean Sea and the Mediterranean—those great transmeridional depressions—wash the shores of lands which show active and recently extinct volcanoes in considerable numbers. The volcanoes of western Asia are probably closely related to the Mediterranean depression, as those of north-east Africa appear to be to that of the Red Sea. Note also must be made of the several volcanoes and volcanic islets that rise from the depths of the great ocean basins.

The causes of volcanic action have formed a fruitful theme for chemists, geologists, and physicists, but none of the conclusions arrived at is wholly satisfactory. Sir H. Davy suggested that if immense quantities of the metallic bases of the earths and alkalies were present in the interior of the earth all the phenomena of volcanic action would be produced by their oxidation from contact with air and water. This view he subsequently abandoned, but it was again taken up and advocated by Daubeny and others. Some writers, again, have maintained that the chief cause of volcanic action is the introduction of water to the highly heated interior of the earth. In some cases—those of quiet eruptions—the water or steam is supposed to be absorbed by the lava in a gradual manner; in other cases—those of explosive eruptions—the water is believed to be suddenly introduced in considerable volume. Both these actions doubtless take place, but steam, however much it may intensify an eruption, can hardly be its ultimate cause. Some lavas, it is true, emit immense quantities, but others again appear to contain a much smaller supply; and we cannot believe that the enormous volumes of lava which flow quietly away from such lofty volcanoes as those of Hawaii have been forced up from below by the mere pressure

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of the moderate amount of steam which they contain. The most probable view is that volcanoes are closely related to those earth-movements which have resulted in the flexing and fracturing of strata. All the greater wrinkles of the earth's surface—its ocean-basins, continental plateaus, and mountains of elevation—owe their origin to the sinking-in of the crust upon the cooling and contracting nucleus. The crust yields to the enormous tangential pressure by cracking across and wrinkling up, in various linear directions, and it is along these lines of fracture and flexure that molten matter and heated vapours and gases are enabled to make their escape to the surface. So far, then, geologists are generally agreed as to the close relation that obtains between fracturing, folding, and volcanic action. But beyond this agreement ceases. By some it is believed that the earth is a practically solid globe—that, notwithstanding its high temperature, the interior is kept in a solid state by pressure. But as the earth parts with its heat it contracts and the crust is fractured and wrinkled up, and the pressure being relieved in this way the solid matter becomes liquefied and is forced upwards through fissures, partly by pressure and partly by the action of imprisoned steam. Others, again, think it is more probable that a liquid of viscous substratum separates the cooled crust from the solid nucleus, while some still favour the old hypothesis of a comparatively thin crust enclosing a liquid or viscous interior. According to these two latter views lava is extruded through rents and fissures formed by the yielding of the crust to tangential pressure—the lava being forced to the surface by the weight of the subsiding crust in adjacent regions. Great mountain-chains adjoin areas of dominant depression, and it is conceived that the viscous-liquid matter of the interior is displaced underneath the sinking regions while an equivalent weight is forced up through fissures in the mountain-chains, and continues to be discharged until equilibrium is restored. In this view the interstitial steam or water-gas which plays so important a part in volcanic eruptions is not the inciting cause of activity. Its presence renders the viscous matter more liquid, and its expansion doubtless increases the force of volcanic eruptions; but the extrusion of lava from the fluid or viscous interior would take place even if no steam were present. But as steam is invariably present in volcanic discharges, and as it could hardly have been derived from the supposed liquid or viscous interior, it is possible that the lava in its upward progress absorbs water from the supplies always circulating through the rocks of the crust. It is certainly remarkable that all the great volcanoes are situated within or along the margins of what are believed to be sinking areas; and the same would appear to have been the case in earlier stages of the world's history. As the continents have increased by successive ridging up of their borders, and the shore-lines of the globe have advanced seawards, the lines of chief volcanic action appear to have advanced with them. Even the few volcanoes that occur in inland regions seem to be situated within or in close proximity to subsiding areas, so that they really form no exception to the general rule. Once more, there is reason to believe that all the notable volcanoes and volcanic islets of the great ocean basins rise from the backs of ridges and swellings of the crust.

See the articles EARTH, EARTHQUAKES, GEOLOGY (with books there cited), LAVA, and the articles on Etna, Hawaii, Iceland, Vesuvius, &c.; works on volcanoes by Scrope, Daubeny, Judd, Kneeland, and Hull (1892), and books on special volcanoes, such as Dana's on those of Hawaii (1892). For volcanic rocks, see IGNEOUS ROCKS.

Vola (*Arvicola*), a genus of rodents typical of the sub-family Arvicolinæ, which also includes the lemmings (Myodes), the musk-rats (Fiber), and several related genera. The genus Arvicola includes over forty species distributed over Europe, Asia, and North America—all more or less like rats and mice. In Britain there are three—the Water-vole (*A. amphibius*), the Field-vole (*A. agrestis*), and the Bank-vole (*A. glareolus*). The

The Field Vole (*Arvicola agrestis.*)

water-vole is about the same size as the brown rat, and rat it is often called. It has dark brown or black fur, a tail about half the length of the body, and very strong hind feet, with five rounded pads on their lower surfaces. It burrows by the banks of streams and feeds for the most part on vegetable food. In summer the female has three or four litters of two to seven young. The water-vole does not occur in Ireland. The field-vole, or short-tailed 'field-mouse,' is about the size of a common mouse, but the body is plumper and the tail shorter. It has brownish-gray fur; its hind feet have six pads. It lives in fields and woods, feeds on vegetable food, is very prolific, and often does much damage. The bank-vole is like the field-vole, but has a 'more or less rusty or rufous-coloured back, larger ears, and a longer tail.' Its habits are like those of the field-vole.

Plagues of field-voles have repeatedly occurred in various parts of Britain. Thus in 1876 they destroyed much pasturage on the Borders and in Yorkshire, and in 1892 they did very serious damage to farms in the south of Scotland. In Roxburgh and Dumfries the plague is said to have extended over 80,000 acres, and a royal commission inquired into the subject. Mild winters and the destruction of the vole's natural enemies —owls, kestrels, stoats, weasels, &c.—are doubtless among the causes of the plague. Various attempts by means of poison, traps, pitfalls, and the like have been made to get rid of the plague; and in Greece Professor Löffler has attained some success by infecting them with a contagious disease. It seems, however, most likely that ultimate success will depend on a restoration of the balance of nature disturbed by the destruction of the 'vermin' which in natural conditions keep voles and similar animals in check.

Volga (a Slav word for 'river'), the greatest river in Russia and the longest in Europe, having a course of over 900 miles in length as the crow flies, or, following its principal sweeps and sinuosities, a length of 2400 miles from its source in a small lake among the Valdai Hills to its mouths in the Caspian Sea. It has a drainage area of 592,300 sq. m., over which there is an annual rainfall of 152 cubic miles, and its annual discharge equals 44 cubic miles, poured into the Caspian Sea

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through 70 mouths. About the middle of its course it has a width of over a mile. It is navigable from near its source, and a wide-spreading system of canals and its numerous tributaries combine to make the river one of the most important waterways in the world. By means of artificial cuttings it communicates with the White Sea, the Euxine, the Baltic, and the Gulf of Finland, as well as with the Don, the Dniester, the Dnieper, the Dwina, and other rivers. As many as 15,000 vessels, including over 500 steamers, navigate the waters of the Volga, and are all engaged in the river trade, a considerable and growing part of which comes from northern and central Asia, but by far the larger portion is derived from the internal commerce of Russia in Europe. Most of the goods exhibited at the great fair of Nijni Novgorod are transported to and from their destinations by means of these river-boats. Traffic almost entirely ceases in winter, when the waters are frozen, the ice-bound stream being only used by such travellers as are compelled to journey during that inclement season, and who drive over the ice and snow in sledges. The fisheries of the Volga are of great importance, sturgeon, carp, and pike being captured in immense numbers by means of the net, the hook, and the harpoon. At the first approach of winter the fish make for the sea, but such is the quantity that large shoals, unable to advance through the crush in front, remain jammed in thick masses in the deeper pools, and are frozen over, until, at the breaking up of the ice, they fall an easy prey to the fishermen. Seal-hunting, near the shores of the Caspian, also employs a number of persons.

The scenery along the upper banks is of a monotonous forest character, marshes and swamps occupying a considerable area to the left, where the ground is low. On the right the land is higher, often rising abruptly from the stream, but farther down the country becomes almost flat, the soil generally being composed of shingle and sand, and here navigation is somewhat impeded and rendered difficult by shoals and banks. This is a steppe region, where trees disappear, but short grass affords excellent pasturage, until, near its mouth, the river enters a desert area. The principal tributaries of the Volga are the Oka, the Kama, the Mologa, the Sheksna, the Unja, the Vetluga, and the Viatka. These are generally navigable for some distance above their mouths, and afford water trade routes to numerous towns at a considerable distance from the main river. The chief towns on the banks of the Volga are Jaroslav, Kostroma, Nijni Novgorod, Kazan, Simbirsk, Stavropol, Samara, and Tzaritzen. These all live as it were by means of the river, and are mostly flourishing places. See German monographs by Roskoschny (Leip. 1887) and Lender (St Petersburg, 1889).

Volhynia, a government in the west of Russia, bounded on the W. by the Polish provinces, from which it is separated by the river Bug. The surface in the north of the government is low, and plains and morasses, covered with forests, abound; in the south there are hills and fertile corn-bearing land. The area (27,743 sq. m.) is larger than that of Greece; pop. 2,264,867. The capital is Zhitomir.

Volition. See WILL.

Volkslied. See SONG.

Volney, CONSTANTIN FRANÇOIS CHASSEBŒUF, COMTE DE, was born at Craon in Mayenne, 3d February 1757. He lost his mother at two, and his youth was solitary, taciturn, and joyless, his health feeble. He studied at Paris medicine, history, and the oriental languages, adopted the name of Volney for that of Chassebœuf, and travelled in Egypt and Syria (1783–87), publishing his *Voyage* (2 vols. 1787), one of the most exact and valuable works of the kind ever published, all personal details being eliminated 'to economise the time of readers'—a circumstance unique in the literature of its class. Volney was elected to the Constituent Assembly in 1789. A Liberal in politics and religion alike and a fast friend of real liberty, he was too honest and outspoken for the times, and was thrown into prison, from which he was freed only after the downfall of Robespierre. His reputation chiefly rests on his famous work, *Les Ruines, ou Méditations sur les Révolutions des Empires* (1791), a characteristic *philosophe's* essay on the philosophy of history. He filled the chair of History in the short-lived École Normale, and lived in the United States (1795–98), collecting the materials for his *Tableau du Climat et du Sol* (2 vols. 1803). In his absence he had been elected to the Institute, and soon after he was admitted to the Academy. Napoleon gave him a seat in the senate, and made him Count, and Commander of the Legion of Honour; Louis XVIII. made him a peer. Almost his latest writing, *Histoire de Samuel, Inventeur du Sacre des Rois* (1819), shows all his anti-religious bias, and his acuteness of mind, and at the same time all those 18th-century limitations of which he was happily unconscious. Volney died at Paris, 25th April 1820. His *Œuvres Complètes* fill 8 vols. (1821). See E. Berger's *Étude* (1852), and Sainte-Beuve in *Causeries du Lundi*, vol. vii.

Volo, a port of Thessaly, on the Gulf of Volo, 37 miles by rail SE. of Larissa. Pop. 11,029.

Vologda, capital of a north-eastern province of Russia (stretching to the Urals), stands on both banks of the river Vologda, 260 miles NE. of Moscow by rail. It has considerable trade, and a pop. (1885) of 17,391. The area of the government (155,498 sq. m.) is a fifth larger than that of Great Britain and Ireland. Pop. 1,239,754.

Volsci, an ancient Italian people, extending from the south-western slopes of the Apennines to the sea, along both banks of the Liris (*Garigliano*), whose capital was Suessa Pometia, and, after its destruction by the Romans, Satricum and Antium. The Volsci were a brave and warlike people who waged almost incessant war with the Romans for 200 years previous to 338 B.C., when they were finally subdued, their territory incorporated into Latium, and they themselves created Roman citizens. The legend of Coriolanus (q.v.) is connected with the Volscian wars. See ROME, TARQUINIUS SUPERBUS, ANTIUM, UMBRIA.

Volsk, a town of Russia, on the Volga's right bank, 70 miles NE. of Saratoff. Pop. 37,044.

Volsungs, a famous heroic race in old German legend, its founder Volsung or Walsung, the grandson of Odin, and its brightest ornament Volsung's son, Siegmund. Sigfried or Sigurd, hero of the Nibelungenlied (q.v.), is of the same stock. The tale is enshrined in the Old Icelandic Volsunga-saga, which has been followed by W. Morris in his *Story of Sigurd the Volsung.*

Volt (derived from Volta), the unit of electromotive force now in universal use among electricians. It is defined legally in terms of the ohm and ampere (see ELECTRICITY). An instrument for measuring voltage is called a voltmeter. The *voltameter* is an instrument for measuring current, as explained at Electricity (q.v.).

Volta, a river of Upper Guinea which, rising in the Kong mountains or highlands behind the Ashantee country, runs southward between Ashantee and Dahomey, and reaches the Bight of Benin through the eastern part of the British Gold Coast.

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To left and right of its mouth it forms great lagoons, and on the bar across the mouth a heavy surf runs.

Volta, ALESSANDRO, physicist, was born at Como, of a noble family, 19th February 1745, and in 1774 he was appointed professor of Natural Philosophy at Pavia, the duties of which office he discharged till 1804, when he retired to his native town to spend the rest of his days; and having been summoned to show his discoveries to Napoleon, and received medals and titles at home and abroad, he died 5th March 1826. It was he who mainly developed the theory of current electricity along purely physical lines (see ELECTRICITY); the term *voltaic* is justly used in many cases instead of *galvanic* (see GALVANI); he it was who discovered the electric decomposition of water, and invented a new electric battery, the electrophorus, and an electroscope. He also made many investigations on heat and gases. His works fill 5 vols. (1816); and there are monographs on him by Bianchi and Mochetti (1829–32), and by Volta (1875).

Voltaire, FRANÇOIS MARIE AROUET DE, was born on 24th November 1694 in Paris, where his father, François Arouet, held a responsible post in the Chambre des Comptes. His mother, who died during his childhood, was well-born and a friend of the famous Ninon de L'Enclos. His godfather, the Abbé de Châteauneuf, exerted a pernicious influence on the precocious boy, and taught him to scoff at religion. In his ninth year he entered the Collége Louis-le-Grand, the chief French seminary of the Jesuits. He soon distinguished himself as a versifier, and the college authorities thought worthy of print his ode to St Geneviève. Although it was devotional in tone, the letters of his schoolboy days are those of a youthful sceptic. Before he had entered his teens he was introduced to Ninon de L'Enclos, who was so struck by him that she left him a legacy of 2000 francs with which to buy books. Leaving college at seventeen, he was destined by his father for the bar, but the study of law disgusted him. His poetic talents, lively conversation, and already pronounced scepticism procured him a welcome from the so-called 'Society of the Temple,' among the members of which were the Anacreontic Abbé de Chaulieu and the Duc de Sully, with other men of rank. Alarmed by the dissipated life which he was leading, his father gladly saw him admitted into the suite of his godfather's brother, the Marquis de Châteauneuf, who after the treaty of Utrecht was appointed French ambassador to Holland; but in consequence of an intrigue with a young lady Arouet, after a few months' stay at the Hague, was sent home in disgrace. In obedience to the command of his exasperated father he entered the office of an attorney, but his stay in it was short, and in a few months more he obtained notoriety as the author of a satire on his successful rival in the poetic competition for a prize offered by the French Academy. After the death in 1715 of Louis XIV. Arouet was suspected of lampooning the regent, the Duc d'Orleans, and was banished for several months from Paris. The evidence that he was the author of a subsequent lampoon, accusing the regent of detestable crimes, satisfied the authorities of his guilt, and he was thrown into the Bastille (May 1717), where he was confined for nearly a year. Meanwhile he had written his tragedy *Œdipe*, and had begun a poem, the hero of which was Henry IV. of France. With his liberation from the Bastille he assumed the name of Voltaire, which is supposed to be an anagram of Arouet l(e) j(eune). *Œdipe* was performed in Paris (18th November 1718) and was triumphantly successful. His next dramatic attempts were, comparatively, failures, and he devoted himself to the completion of his poem on Henry IV., which was to be published by subscription. But he had selected for a hero a prince whose chief distinction was the championship of the Protestant cause, and the poem contained praises of religious toleration and an unflattering description of the papacy. All this induced the authorities to refuse the sanction needed for publication. Voltaire had the poem surreptitiously printed at Rouen (1723) and smuggled into Paris, when, as *La Ligue ou Henri le Grand, Poème épique*, it was widely read and greatly admired. Voltaire was pushing his way at court, and being patronised by the newly-wedded queen of Louis XV., when there occurred the catastrophe which drove him from France. A certain Chevalier de Rohan-Chabot, a scion of the great house of Rohan, addressing him contemptuously as a parvenu, Voltaire retorted with spirit, and seems to have written and circulated some caustic epigrams on the man who had insulted him. The chevalier's revenge was to have Voltaire cruelly beaten by his hirelings. The authorities refusing him proper redress, Voltaire resolved on challenging the cowardly author of the outrage, with the result that Voltaire was once more thrown into the Bastille. After a short imprisonment, he was liberated on the condition that he would proceed forthwith to England, where he landed about the end of May 1726.

Voltaire brought with him letters of introduction to several persons of station. Bolingbroke, with whom he had been intimate in France and who was now in England, made him known to Pope and his circle. He made the acquaintance of Peterborough, Chesterfield, the Herveys, and heard from the Duchess of Marlborough anecdotes of the times of Queen Anne. He became more or less intimate with Young, with Thomson, and with Gay. Having learned to read English with ease, and even to write it intelligibly, he acquired some knowledge of Shakespeare and Milton, Dryden and Butler, and a familiarity with what Pope had written, with Addison's *Cato*, and with the so-called dramatists of the Restoration. He was strongly attracted to Locke among philosophers, and he mastered the elements of Sir Isaac Newton's astronomical physics. Bolingbroke's conversation and the writings of the English Deists furnished him with many of the weapons of which he made use in his subsequent attacks on the theology of Christendom. George II.'s consort, Queen Caroline, accepted his dedication to her of the *Henriade*, the new form of *La Ligue* (the publication of which had been one of the objects of his visit to England); and the list of subscribers to it included with the king and queen a number of the nobility and gentry. When he was permitted to return to France early in 1729, after a residence of nearly three years in England, he took with him, among other fruits of his literary industry in exile, his *History of Charles XII.* and the materials for his *Letters on the English*. The letters were full of contrasts, certain to offend the ruling powers in France, between English liberty, political, and especially intellectual, on the one hand, and French despotism of every kind on the other.

On his return to Paris Voltaire laid the foundation of what became great wealth, by the sagacious purchase of shares in a government lottery, and by speculations in the corn-trade, to the profits of which were added a few years afterwards those arising from large army contracts. He formed a very close intimacy with Madame du Châtelet (q.v.), a lady of distinguished connections, very clever, accomplished, and scientific, whose husband was a cipher. He had a château, Cirey, in Champagne, and thither Voltaire fled in the summer of 1734, an order having been issued for his

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arrest on the publication, unauthorised by him, of his *Letters on the English*, accompanied as they were by heterodox comments on Pascal's *Thoughts*. Soon he and Madame du Châtelet made Cirey their headquarters, paying occasional visits to Paris and elsewhere. At Cirey Voltaire wrote dramas, *Merope* and *Mahomet* among them; poetry, philosophical and other; his *Treatise on Metaphysics;* much of his *Siècle de Louis Quatorze* and *Les Mœurs et l'Esprit des Nations*, with his *Elements of the Philosophy of Newton*. Here he fitted up a laboratory and studied physics and chemistry; and here he received (August 1736) the first letter written to him by his admirer, the Crown-prince of Prussia, afterwards Frederick the Great. Since the appearance of his *Letters on the English* he had been out of favour at court. But he wrote at the instance of his friend the Duc de Richelieu a dramatic piece, the *Princesse de Navarre*, which was performed on the occasion of the Dauphin's marriage (February 1745); and its adroit adulation pleased Louis XV. This and the patronage of Louis's new mistress, Madame de Pompadour, procured him the appointments of royal historiographer and of gentleman-in-ordinary to the king, as well as his election to the French Academy—distinctions which he sorrowfully owned were due to anything but his really meritorious contributions to the literature of his country. The court favour which he now enjoyed proved to be fitful. In 1747 an imprudent speech at a court card-party drove him to take refuge with an old friend, the Duchesse de Maine, for whose amusement he now wrote *Zadig* and others of those oriental tales which are among the most popular of his writings. When he was allowed to reappear at court, some injudiciously expressed flattery of Madame de Pompadour excited the indignation of the queen, and Voltaire had again to migrate. Oddly enough he and Madame du Châtelet became the welcome guests at Lunéville of ex-King Stanislaus, the French queen's father. A *liaison* with a young officer resulted in the death (September 1749) of Madame du Châtelet after she had given birth to a child of whom her new lover was the father.

The king of Prussia had more than once urged Voltaire to reside permanently at his court. But Voltaire would not consent unless he were to be accompanied by Madame du Châtelet, and to this arrangement Frederick had an insuperable objection. By her death a chief obstacle was removed. In July 1750 Voltaire found himself at Berlin, with the office of king's chamberlain, a pension of 20,000 francs, and board and lodging in one of the royal palaces. But the friendship of the king and the poet was soon disturbed. Voltaire entered into some questionable financial and other operations in association with a Berlin Jew. The result was a lawsuit, and during the proceedings disclosures discreditable to Voltaire irritated the king against him. Frederick was still more gravely offended by Voltaire's satirical criticisms on Maupertuis, whom the king had made president of his Academy of Science and for whom he had a great regard; and in March 1753 Frederick and Voltaire parted, never to meet again. The chief literary result of Voltaire's stay in Prussia was the completion and publication of his *Siècle de Louis Quatorze*.

Soon after leaving Prussia Voltaire was arrested and kept for several weeks in confinement at Frankfort, partly through the bungling of Frederick's representative in that city, who had been instructed to recover from Voltaire a volume, privately printed, of the king's poems. Voltaire avenged himself by writing the well-known and malicious sketch of Frederick's character and account of his habits, which, however, was first printed, and then surreptitiously, after the writer's death. After various wanderings Voltaire settled, early in 1755, near Geneva. From Les Délices, as he called his first Swiss home, he removed about 1758 to Ferney (q.v.), which was in French territory, some 4 miles from Geneva on the northern shore of the lake. During the first five years of his settlement in Switzerland appeared his greatest historical work, *Les Mœurs et l'Esprit des Nations*, his pessimistic poem on the earthquake of Lisbon, and its prose-pendant, the famous *Candide*. The suspension of the *Encyclopédie* by the French government, and the sentence of the parliament of Paris condemning to be burned by the public executioner a harmless poem of his own on natural religion, impelled Voltaire to issue his celebrated declaration of war against L'Infâme. In 1762 appeared the first of those writings assailing the Christian faith which flowed from his pen until the end of his life. In the same year occurred at Toulouse the judicial murder of Jean Calas (q.v.), falsely accused of having, from Protestant zeal, killed one of his sons to prevent him from becoming a Roman Catholic. Voltaire exerted himself strenuously, and at last successfully, to have the sentence annulled, and to rescue other members of the Calas family from the punishment to which, as unjustly convicted accomplices, they had been condemned. This and similar efforts on behalf of victims of French fanaticism procured Voltaire the gratitude of numbers of his countrymen, the applause of other nations, and, ever since, the admiration of many to whom his attacks on Christianity have been and are utterly repugnant. It is not so well remembered that even in theology he endeavoured to exert a conservative influence, and that he was regarded as a reactionary by the adherents of the atheism which during his later years became fashionable in France. The unadulterated atheism of Baron d'Holbach's *System of Nature*, issued in 1770, he vehemently opposed; and five years before the appearance of that work Horace Walpole reported from Paris the speech of a French lady who said contemptuously of Voltaire: 'He is a bigot, he is a Theist' (*Il est bigot, c'est un déiste*).

The varied activity of Voltaire in his old age was immense. Among the works which he composed while domiciled in Switzerland were histories of *Russia under Peter the Great* and of the *Age of Louis XV.;* the *Dictionnaire Philosophique*, still often dipped into; a *Treatise on Toleration;* and *Fragments on the History of India;* besides tales, philosophical treatises, and tragedies and comedies. He kept up an enormous correspondence, resuming that with Frederick, and entering into a new one with the most friendly of his crowned admirers, the Empress Catharine of Russia, whom he urged with great but fruitless fervour to drive the Turk out of Europe, and to revive, as far as it could be revived, the ancient glory of Greece. He looked keenly after his many and widely-spread investments, made so successfully that his later income was computed to amount to what would now be £20,000 a year. He farmed, reclaiming waste land, planting, rearing poultry, and breeding horses. What is more striking, he established at Ferney a watch-making industry which competed with that of Geneva, and which he fostered by appeals on its behalf to all and sundry, from the Empress Catharine downwards.

The death in 1774 of Louis XV. removed the principal obstacle to a visit of Voltaire to Paris, but it was not paid until 1778, when he was in his eighty-fourth year, and then ostensibly to superintend the arrangements for the performance of his last tragedy, *Irène*. After an absence of thirty-four years he arrived in Paris in February 1778, and was welcomed enthusiastically by all that

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was most distinguished socially and intellectually. When he drove out the progress of his carriage was obstructed by the pressure of immense and acclaiming crowds: 'It was he who defended the Calas' was the reply of one among them who was asked by his neighbour the reason for the prevalent excitement. Frantic, literally, was the enthusiasm, which a house crowded to suffocation displayed for hours on the occasion of his visit to the Comédie Française to witness the representation of *Irène;* one of the leaders of the applause being the Comte d'Artois, afterwards Charles X. These and other excitements, telling on the infirm frame of the old man, brought on an attack of illness which was aggravated by an injudicious administration of opiates. Delirium alternating with torpor supervened, but with intervals of lucid consciousness. A few hours before his death two priests entered the sick-room, and to a professional appeal from one of them he replied, 'Let me die in peace.' The end came on the night of the 30th May 1778.

Of the numerous French biographies of Voltaire much the best is the elaborate work of Gustave Desnoiresterres, *Voltaire et la Société du XVIII^e Siècle* (2d ed. 8 vols. 1887); and Bengesco's *Voltaire: Bibliographie de ses Œuvres* (4 vols. 1882-91) may also be consulted. An American life of Voltaire by the late James Parton (1881) is copious and displays industry. Mr John Morley's *Voltaire* (1872; new ed. 1886) is more a criticism than a biography. Strauss's six lectures appeared in 1871 (4th ed. Bonn, 1878). There is a biography of Voltaire by General Hamley in the 'Foreign Classics for English Readers' (1877), and another by the writer of this article in the 'Great Writers' series (1892).

Volterra (anc. *Volaterræ*), a Tuscan town of 5500 inhabitants on a hill 35 miles SW. of Pisa by rail, with important Etruscan and other remains. See ETRURIA, Vol. IV. p. 446.

Voltri, a coast town of Italy, 9 miles W. of Genoa by rail. Pop. 6358.

Volumes, LAW OF. See CHEMISTRY, p. 150.

Volumetric Analysis. See ANALYSIS.

Voluntaryism, the polity of those who insist on the absolute separation of church and state, disapprove utterly of church endowments and state grants for religious purposes, seek the disestablishment and disendowment of established churches, and recognise alone as consistent with true religious liberty and equality the support of churches and clergy by the voluntary payments by the members. Most Nonconformists are more or less voluntaries. For the 'Voluntary Controversy' in Scotland, see UNITED PRESBYTERIAN CHURCH; and for the arguments for and against state churches, books cited at STATE RELIGION.

Volunteers. The volunteer movement of Great Britain is unique in the history of nations. In 1859, on the occurrence of a menace to Great Britain, which for the first time for a long period seemed to indicate a possibility of invasion, the volunteer spirit spontaneously rose up. General Peel, who was then war minister, realised its importance, and by his advice it was resolved to accept the services of those who might offer themselves. No promise of pecuniary aid to meet necessary expenses, far less of pay or of reward, was held out. If volunteers would equip themselves with uniform, accoutrements, and arms, and supply themselves with military instructors, all at their own expense, the state would accept their services. These were the conditions. The volunteers were to find everything, and then the state would consent to use them. The response was an astonishment to the world, and not least to Great Britain herself. An armed force rose up as if by magic. Men of all professions and trades thronged to enrol themselves, devoting much of their leisure time to their volunteer work, submitting to the discipline of drill in a hearty and vigorous manner, and paying at something like the rate of £8 per man for arms, uniform, and accoutrements, in addition to instructors' salaries, rent of rooms and ground, and other necessary expenses. In a very few months the numbers swelled above 100,000, artillery and riflemen, and daily offers of service came from new companies, notwithstanding the fact that the alarm which first awakened this martial spirit had died away, and there was no longer any immediate prospect of hostilities to stimulate and keep alive the enthusiasm that had been evoked. It became apparent that the spirit was one inherent in the national character, and had not been created but only aroused by the event which has always been directly associated with its origin. It demonstrated, what observant men had known before, that the British, although they are not a military nation—indeed hate militarism—are yet at bottom a warlike race. Within little more than a year of the first enrolments the Queen was able to see assembled two great bodies in Hyde Park and in Queen's Park, Edinburgh, numbering in all about 80,000 soldiers, who had been taught the elements of military drill, and were able to move in large bodies without confusion. The expectation at first had been limited to some thousands of sharp-shooters, who might be useful for hanging on to and harassing an enemy, and thus giving a certain amount of external aid to the efforts of the army. So restricted was the idea of the capabilities of the force that a special drill-book, known as the Green Book, was issued for volunteers, in which the company was taken as the largest unit. There was no idea of volunteer battalions taking their part as integral portions of brigades. They were only to be administratively in battalions, but in training the companies were to be the units. Their role was to be that of irregulars, not of soldiers who would take their places in the British line, and fight side by side with the enlisted forces of the crown. But the numbers, the drill, and the capacity for organisation shown by the new force made its consolidation into the larger unit of the battalion a thing of course, and its conformity to the drill of the army a necessity. Indeed this had worked itself out even before the Green Book was ready for issue. When it was issued it was already utterly unsuitable to the existing state of things. In all the large towns battalions were already organised and in active training; and the administrative organisation was in a very short time confined to the country districts. Even in their case, after the lapse of a few years, consolidation took place, and for many years the volunteer force has been administered, exercised, and dealt with from headquarters in battalions, just as are the regiments of the regular army and the militia. It has now found its place—and that no mean one—as part of the organised defences of the country, and in 1888 a further step was taken in its organisation in district brigades, each under a brigadier-general, who would command it as a separate unit in the event of its being mobilised for service.

As might have been expected, the volunteers, who gave their services and provided at their own expense all that was required for equipment and drill, could not be expected thus to tax themselves in perpetuity while giving their actual time and labour without pay or reward. Accordingly the question soon arose, Is this force worth the expense to the country of providing the necessary armament, clothing, and equipment? The question was made the more urgent by its becoming apparent that the

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moneyed and well-to-do classes, who at first formed the great bulk of the volunteer force, were not so patriotic in time of peace as to continue to enrol themselves, and sacrifice comfort and time in drilling and practising at the target for the country's defence. It is unpleasant to be compelled to record that year after year the numbers of the leisured, the professional, and the middle-class volunteers diminished, that it became impossible to keep up companies recruited from these ranks, that many of them ceased to exist as such and were replaced by companies of artisans, and that many which maintained their existence did so only by taking into their ranks their employees in the lower grades of their profession. Merchant companies enlisted their shopmen, solicitors' companies enrolled their clerks, barristers' companies dissolved, and gradually the whole character of the force was changed. It became, as regards the rank and file, a workingmen's force. The great mass of those now enrolled are men dependent upon weekly wages or small salaries for their subsistence, to whom the expense of providing uniform and accoutrements would be altogether prohibitive. Further, those who in the early days of the movement had contributed liberally to the funds of the corps in their district ceased to do so. The novelty of the movement was gone, and those whose enthusiasm was not strong enough to induce them to serve ceased to yield to appeals to their purses. The volunteer force had during its earlier years been too much petted and praised, and its rapid development into a great force had raised among a certain class of military men some degree of jealousy and a not altogether unjustifiable feeling of distrust. There could have been nothing worse for the volunteers than that they should be told that they were as good as the soldiers of the army, and that economists —falsely so called—should laud them to the skies in order to urge that their existence justified a reduction in the regular forces. The evils which followed this period of foolish flattery were those which might have been expected. The flatterers got a little tired of their toy, and cold indifference followed too warm attentions. The force itself did not develop with that vigour which follows good discipline and judicious correction. It was a critical time, and was seen to be so. Fortunately it was met with wisdom. Those responsible for the maintenance of the defences of the country saw that it was an institution worth preserving and capable of high development. Accordingly it was resolved, with the universal approbation of the nation, to relieve the volunteer of outlay, and to supply that which should be necessary to clothe him, and pay the expenses of organisation and management of the corps, while at the same time bringing the force into closer association with the military authorities, and exacting a distinct standard of efficiency as a condition of the payment of the grant. The good effect of this alteration was at once apparent. Efficiency rose in a marked degree, and the officer element in the force steadily improved. The demand for higher efficiency necessarily led to many of the older officers retiring, and giving place to younger men, better suited for training and manœuvre, and who were in a true military sense the commanders of the volunteers under them.

The occurrence of the Franco-German war gave a new stimulus to the volunteer spirit, and it began to be the custom to place volunteer battalions in brigade with the regular troops at manœuvres on a large scale. This was first done in 1872, when a very large force was assembled on Salisbury Plain, on which occasion many provisional battalions, made up of volunteers from different corps, took their full part in the work, and earned the encomiums of all who saw them for their plucky marching, adaptability to camp-life, and general excellence in discipline. This was followed up in the following year by extensive manœuvres on Dartmoor and at Cannock Chase; and from that time onwards in every year a very large number of volunteers have been under canvas, until in the year 1892 every district of the country saw volunteers camping out either in battalion or brigade, no fewer than 13,000 being assembled at one time at the camp of Aldershot.

A great change has also come over the character of the work done by volunteers. In the first decade of the force's existence its work was for the most part confined to mere elementary drill of the barrack-square type, and its equipment limited to what was necessary for mere show parade; but a very great change has taken place in these particulars. The prolonged existence of the force, and the fact that at the end of twenty years it was found in full vigour, and increased in numbers practically to a quarter of a million in strength, made its impression on the governing minds of the country and army. The Queen in 1881 again gave the volunteers an opportunity of appearing before her in strength. The English review in Windsor Park was a magnificent display, but the Scottish review in Queen's Park, Edinburgh, was the most remarkable event in the history of the force. It was held in such a deluge of rain that all present were for many hours soaked to the skin, and the greater number had to be entrained and conveyed to distant places in that state. The discipline of the force stood the test well, and this event, which was at the time regarded as a great misfortune, was indeed a most fortunate occurrence. It was well that the qualities of the volunteers when assembled in very large bodies should be put to the test, and in no other way could it have been so effectually done. From that day forward the military mind has had a much higher appreciation of the *morale* of the volunteers, and their capabilities for disciplined action, than it ever had before. Of course, it is only the capacity for high discipline that is spoken of, for discipline is not merely a matter of character, it must be developed by training.

In connection with the army reforms of 1872–81 the volunteers were incorporated formally with the territorial regiments of their districts, so that the corps in each district are now the volunteer battalions of its regiment. But the greatest compliment ever paid to the volunteers was not, however, to be found in the praises of generals or the plaudits of the public. It was in a new demand made upon it, a demand which never could have been made had those at the head of the army not considered the force to be one capable of high usefulness. In 1886 it was officially intimated that the volunteers must pass a certain standard of efficiency in musketry, take steps to provide themselves with accoutrements and equipment, not merely to enable them to appear upon parade or at a sham-fight with a few blank cartridges, but to be ready to march at once, and that upon the fulfilment of these conditions their certificate of efficiency must depend. To these demands the volunteers had no objection, except this, that they thought it hard that, giving their services gratuitously in time of peace, they should be called upon to provide, at their own expense, the equipment of which the state would have the use in time of war. And although in some places money was raised by private subscription, it was felt both by the volunteers and the public that this was not a seemly mode of raising money for what was essentially a national purpose. Accordingly, after one government had been narrowly saved from an adverse

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vote, and another had a vote carried against it in the House of Commons, it was resolved to devote a sufficient sum from the public funds to furnish the volunteers with an efficient war equipment. Therefore to-day every volunteer rifleman is provided with greatcoat, water-bottle, haversack, and means of carrying a full supply of ammunition, so that in the event of mobilisation every man can be turned out ready to march.

In the case of the artillery also a great step has been taken. Until 1888 they had no field-guns, and were exercised only at fort-guns. But now a large number of mobile guns have been issued to them, and they are exercised so as to move with the other troops. A new development has also taken place in the organisation of submarine mining corps, which with the existing engineer corps would be of great value.

Further, for many years the officers of the volunteer force have been examined in drill to pass as lieutenants and for promotion to the higher ranks, and have had the opportunity of attending school and receiving special certificates on passing out. They have also had the opportunity of entering for examination in tactics, and many of them have gained the higher certificates. Among the rank and file mounted contingents have been encouraged, signallers and stretcher-bearers and military cyclists are regularly trained, and in 1892 the issue of machine guns was sanctioned. Tactical societies have been established in many cities throughout the country, both for officers and non-commissioned officers, in which Kriegspiel (q.v.) is played, and lectures on tactics, military history, and other kindred subjects are delivered. It is only further necessary to mention the National Artillery and Rifle Associations, and their kindred local gatherings, as strong elements of vitality in the volunteer force.

The Queen recognised the force with special favour by opening to it in 1881 a certain number of decorations of the Order of the Bath, and also by sanctioning, in 1892, a special decoration for officers who have served for twenty years.

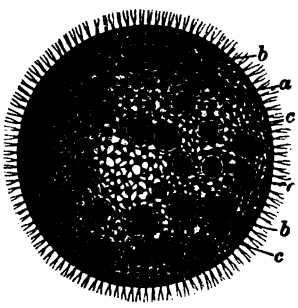
The force, which now numbers about a quarter of a million, is in full vigour, and, as more than one-fifth of the whole on an average is changed every year, it is obvious that besides the existing force there must be at least a million and a quarter more who have had the training and are still of suitable age for service, who, should the occasion ever arise, can be more quickly trained than raw recruits for the country's defence. Thus there is a great reserve. The weak point at present is that in many places it is difficult to obtain suitable officers. This is the result of the apathy of the upper classes already spoken of. Indeed it is to be feared that as regards both the commissioned rank and the rank and file there is often not only apathy but veiled or open discouragement to young men to become volunteers. This is cause for deep regret on the part both of parents and employers, and it is earnestly to be hoped that it may be overcome. If the volunteer force is to continue to flourish it can only be in the warmth of the nation's fostering regard. Men cannot *volunteer* when their services are not wanted or valued, and no mere official recognition will prevent the life going out of a national movement. The blood to keep it warm must come from the nation's heart.

In the United States the place of the volunteers is filled by the state militia (see ARMY, p. 437). In Germany 'volunteers' has quite a different meaning (see ARMY, p. 436; and GERMANY, p. 177). For the relation of the auxiliary forces to the regular army in linked battalions, see ARMY, p. 434; also MILITIA and YEOMANRY. There are histories of the volunteer movement by Stephen (1881) and Woodburne (1881).

Volusenus, FLORENTIUS (Florence Wilson, or Wolsey), a distinguished Scottish humanist, was born near Elgin at the opening of the 16th century. Having received his early education in Scotland (probably at Aberdeen), he seems to have proceeded to the university of Paris. Like his contemporary and personal friend George Buchanan, he cultivated classical learning in preference to the logic and philosophy of the schoolmen, and attained a mastery of Latin which gives him a place with the first scholars of his time. After acting as tutor to a son (spoken of as a nephew) of Cardinal Wolsey, he eventually became principal of a school at Carpentras, near Avignon, a position he owed to the favour of Cardinal Sadoleto. In 1546, on his way home to Scotland, Volusenus (we have no authority for the name *Wilson*) died at Vienne in Dauphiné, lamented by Buchanan in a Latin quatrain, which proves the strength of their friendship. His chief work is his *De Animi Tranquillitate*, written in the purest classical Latin, every page of which reveals the essential refinement and moral beauty of his nature. See Irving, *Lives of Scottish Writers*, and *The Bannatyne Club Miscellany*, vol. i.

Volute, in Architecture, the spiral ornaments of the Ionic and Corinthian capitals, probably derived from Assyrian architecture, in which it is also used. See illustration at COLUMN; also EVOLUTE.—The volute shells, forming the Gasteropod family Volutidæ, are chiefly tropical shells, many of them of great beauty and much valued by collectors. The only common British species is *Voluta tornatilis;* valuable ones are *V. imperialis*, *V. musica*, and *V. junonia*.

Volvox, a genus of simple organisms which some authorities regard as animals and others as plants, but which are in fact not very emphatically the one or the other. They consist of green flagellate cells, united by protoplasmic bridges in a hollow spherical colony, and occur in ponds, canals, and clear fresh-water pools. Botanists claim them as Algæ, referring them to a family of the order Coccophyceæ; zoologists claim them as animals, as colonial flagellate Infusorians. Each unit of the colony is somewhat like the common Hæmatococcus; and sometimes there may be as many as 12,000 forming one ball, which then measures about 1 mm. in diameter. Volvox is a very beautiful organism, and is full of interest to the biologist. Thus, as regards reproduction, one may be found quite asexual in its multiplication, another may be described as parthenogenetic, a third produces special male and female cells, while in others the sexes are separate. Within one species all these phases may occur, epitomising the whole evolution of sex. As a very simple many-celled organism Volvox also gives some hint as to transition from Protozoa to Metazoa. Nearly related are the genera Eudorina, Pandorina, Gonium, and Stephanosphæra.



Volvox globator (much magnified): *a*, female cells; *b*, stages in development of male cells; *c*, ordinary flagellate cells.

Volvulus. See COLIC.

Vomer, a bone which, in the human skeleton, forms part of the middle partition of the Nose (q.v.). It exhibits many modifications in the different classes of Vertebrata.

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Vomiting. The physiology of vomiting has already been discussed (see DIGESTION, Vol. III. p. 817); and it only remains to indicate its significance in disease, and its treatment. It is much more common and more easily induced in children than in adults, and generally speaking in men than in women. In some cases it is entirely salutary—e.g. when poison, or food irritating in quality or excessive in quantity, has been taken, and it should be encouraged and not checked. It is common, especially in children, as a symptom of the onset of many acute diseases. When persistent or recurrent it most frequently depends upon disease of the digestive organs, particularly the stomach. But this is by no means necessarily the case; during the early months of pregnancy vomiting ('morning sickness') is so common as hardly to be abnormal; in consumption, Bright's disease (see under KIDNEYS), and disease of the brain (tumour, abscess, meningitis) it may be for a time the most prominent, or even almost the only symptom. (In the vomiting attending brain disease, rarely under other circumstances, nausea, or the sensation of sickness, may be entirely absent.) It is obvious therefore that it is of the greatest importance to discover in the first instance the real cause of the vomiting, and attempt to remove it by suitable treatment. Some of the means most generally useful in checking vomiting may, however, be mentioned. Food should be administered in a liquid form, and in very small quantities at a time (e.g. milk diluted with an equal quantity of potash-water, or lime-water, not more than a wine-glassful at once), or even for a time withheld altogether. Small pieces of ice sucked or swallowed, and a mustard poultice or fly blister applied to the pit of the stomach are often useful. Of drugs, preparations of bismuth, hydrocyanic acid, creasote, chloroform, lime-water, ipecacuan wine (in doses of a single drop every hour), opium, and morphia are among the most valuable.

Vom'ito Negro ('Black Vomit'), an acute form of Yellow Fever (q.v.).

Vondel, JOOST VAN DEN, a great Dutch poet, born at Cologne, November 17, 1587, kept a hosier's shop in Amsterdam, and died there, 5th February 1679. Of his thirty-three plays the most interesting is *Lucifer* (1654), which suggests in some points a parallel with *Paradise Lost*, on which a preposterous case of borrowing has been constructed by Mr Gosse (*Studies in North. Lit.*, 1879), and still more by Mr George Edmundson (*Milton and Vondel*, 1885). The latter pursues his gratuitous task still further, finding in *Samson Agonistes* plagiarisms from a classical drama of Vondel's *Samson; or Divine Vengeance.*

Lennep edited his complete works (12 vols. 1850–69). See the studies by Baumgartner (Freib. 1882); Looten (Bruss. 1889); and the bibliography by Unger (Amsterdam, 1888). See also Vol. V. p. 745.

Voodoo. See NEGROES.

Voragine, JACOBUS DE. See GOLDEN LEGEND.

Vorarlberg, the western portion of Tyrol (q.v.).

Voronej, or VORONEZH, capital of a Russian government of the same name, stands on the right bank of the Voronej, 300 miles SE. of Moscow by rail, with considerable trade; pop. (1888) 56,179. The government has an area (25,443 sq. m.) as large as the kingdom of Greece; pop. 2,588,933.

Vörösmarty, MICHAEL. See HUNGARY, p. 8.

Vortex, in the ordinary meaning of the term, is a whirlpool. We find illustrations of it, on a large scale, in tornadoes, waterspouts, and whirlpools, and, on a smaller scale, in eddies of air or water produced by conflicting currents. If we draw the half-immersed blade of a teaspoon gently along the surface of tea or coffee we shall see two small eddies following in the wake of the edges. These eddies are the visible ends of a half ring of whirling liquid, which is formed originally as a fringe to the blade of the spoon. Similar effects may be observed in rowing as the oar is lifted out of the water at the end of the stroke. The general characteristic of such eddies is a rotational motion of the smallest visible portion in the centre. From this we readily pass to the scientific conception of vortex motion in fluids. Imagine a continuous frictionless fluid, which cannot therefore be molecular, for that would imply Viscosity (q.v.); and suppose any small spherical element to become solidified. If this elementary sphere is found to be rotating about any axis, there is vortex motion in the fluid at the region occupied by the element. If there is no vortex motion, the elementary sphere will have no rotation however complicated the motion of the fluid may be. Von Helmholtz, who first investigated the properties of vortex motion, showed that where vortex motion once exists in a frictionless fluid it must always exist, and where at any instant it does not exist it never can exist. Moreover a vortex with ends cannot exist in the fluid. Either it must form a closed ring or it must continue through the fluid until it stops at the boundary. These properties mathematically proved for the perfect frictionless fluid cannot be fully realised in practice. Indeed the possibility of forming vortex rings depends on the existence of viscosity; and the same viscosity finally destroys the vortex motion so produced. Vortex smoke-rings are often formed at the firing of a gun or mortar or even from the funnel of an engine, or on a smaller scale by a puff of tobacco smoke emitted from the mouth of a skilled smoker. Vortex rings may be produced with great ease by projecting them through an orifice in one side of a closed box whose opposite side is made of cloth or sheet india-rubber or other elastic material. To make the rings visible we may produce inside the box a cloud say of sal-ammoniac; and at every tap on the elastic side of the box a very evident vortex ring will be ejected. When one such vortex ring is following another, the one in front will open out and let the other shoot through it. This one in its turn will open out and slacken speed, while the one that is now behind will contract and accelerate its pace and pass through the other and again get in front. Von Helmholtz showed that this action would go on indefinitely in the perfect fluid. The laws governing the collision and vibration of vortices may also be illustrated by means of smoke rings in air. Lord Kelvin's conception of the material atom as a vortex ring of simple form, or of any degree of beknottedness, is one of the brilliant conceptions of the present era. Such a vortex atom in a frictionless plenum is as indestructible as the hard Lucretian atom, and yet is capable of vibration. See ATOM, HYDRODYNAMICS.

Vorticella, or BELL-ANIMALCULE, a genus of ciliated Infusorians belonging to the order Peritricha, in which the cilia are restricted to a fringe around the mouth. During most of their life the little animals are attached to the stems and leaves of plants in fresh-water pools, a group being just visible to the unaided eye as a whitish fringe. Each is a bell-shaped unit borne on a hollow stalk containing a contractile filament, whose activity causes the stalk to change frequently and instantaneously from a state of complete extension to a state of spiral contraction. Around the mouth of the bell there is a spiral fringe of cilia, which, by their lashing activity, waft food-particles into the mouth. A vorticella often reproduces by division, one of the halves being set adrift, furnished with a

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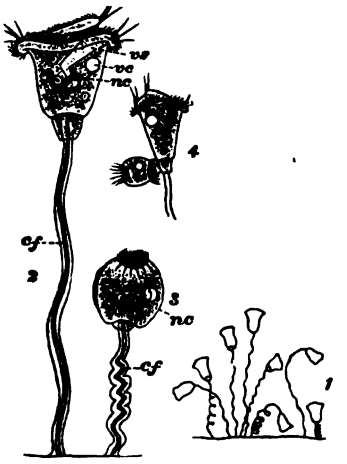
posterior circlet of cilia. Or it may be that after division into two one of the halves, still undetached, divides rapidly into eight small units,



Vorticella (after Howes):

1, general appearance of a group, magnified; 2, single individual fully extended; 3, the same with spirally contracted stalk; 4, liberation of half of a divided unit; *nc*, nucleus; *vs*, mouth; *vc*, vacuole; *cf*, contractile filament of stalk. Nos. 2, 3, 4, highly magnified.

which, becoming separate, swim off (also with posterior cilia), and conjugate with sedentary individuals of normal size. There is here one of the early hints of sexual dimorphism.

Vortigern, the British prince who is reported by Bede, Nennius, and Geoffrey of Monmouth to have invited the Saxons into Britain to help him against the Picts, and to have married Rowena, daughter of Hengist (q.v.). His allies soon became, according to the legend, enemies even more dangerous than the Picts, and soon destroyed the British princes. Samuel Ireland (q.v.) fathered his 'historical' play of *Vortigern* on Shakespeare.

Vos, CORNELIS DE (1585–1651), a painter who adhered to the manner of the older Dutch school, and became famous for portraits, and religious and mythological pieces.—His brother Paul (1590–1678) painted animals and hunting scenes.

Vosges (Lat. *Vogesus*, Ger. *Vogesen* or *Wasgau*), a range of mountains in the north-east of France and the west of Germany, run from south to north, on the left bank of the Rhine, from the borders of Switzerland to Mainz, and separate Alsace from the French departments of Vosges and Meurthe and the German Lorraine. The range runs parallel with the Black Forest, on the right bank of the Rhine, which it much resembles in picturesque well-wooded appearance and geological structure. The highest summits, which are in the southern portion, run from 4100 to close on 4700 feet high, and form the western border of this part of the Rhine basin. See H. W. Wolff's *Watering-places of the Vosges* (1891) and *The Country of the Vosges* (1892).

Vosges, a dept. in the north-east of France, formed out of the south part of the old province of Lorraine, is bounded on the E. by German Alsace. The surface is mountainous, the hills being well wooded, while the western plain is very fertile. There are iron, silver, lead, copper, cobalt, zinc, manganese, and antimony mines. The dept. has an area of 2266 sq. m. and a pop. (1891) of 410,196 (in 1886, 413,707). It is divided into the five arrondissements Épinal, Mirecourt, Neufchâteau, Remiremont, Saint-Dié. The capital is Épinal.

Voss, JOHANN HEINRICH, scholar and poet, was born of poor parents at Sommersdorf in Mecklenburg, 20th February 1751. At first a tutor, he began in 1772 to study at Göttingen, and there joined the famous Dichterbund. From theology he soon turned to Greek and Roman antiquities under Heyne. In 1778 he went from the editing of the *Musenalmanach* at Wandsbeck to be rector at Otterndorf. Here he prepared his translation of the *Odyssey*. In 1782 he became rector of Eutin, whence in 1789 he issued his translation of Virgil's *Georgics*. His controversies with Heyne form his *Mythologische Briefe* (2 vols. 1794); in answer to Creuzer he wrote *Antisymbolik* (2 vols. 1824–26). In 1802 he settled in Jena, was called in 1805 to Heidelberg, and there died, March 29, 1826. At Heidelberg he translated Horace, Hesiod, Theocritus, Bion, Moschus, and Tibullus; other translations were Aristophanes and (with the aid of his two sons) Shakespeare—a work far inferior to Schlegel's. His original idyllic poem, *Luise* (1795), rests secure of immortality. See biographies by Paulus (1826) and by Herbst (2 vols. 1872–76).

Vossius, GERARD JAN, a great 17th-century scholar, was born of Dutch parents near Heidelberg in 1577. He studied at Leyden, and became in 1600 rector of the school at Dort, in 1615 of the theological college of Leyden. His *Historia Pelagiana* (1618) offered a modest apology for the Arminians, which brought down upon him the wrath of the orthodox. He anticipated his dismissal by resignation. Laud procured him a prebend without residence worth £100 a year. In his book *De Historicis Latinis* (1627) he made a prudent recantation. In 1632 he was appointed to the chair of History in the newly-founded *Athenæum* at Amsterdam, and here he died, 27th March 1649. All his life he had toiled with ceaseless industry, of which the chief monuments are *Aristarchus sive de Arte Grammatica*, *De Historicis Græcis*, *Commentariorum Rhetoricorum sive Oratoriarum Institutionum Libri VI.*, *De Veterum Poetarum Temporibus Libri II.*—ISAAC VOSSIUS, his son, was born at Leyden in 1618. He travelled in England, France, and Italy, collecting many valuable manuscripts, and in 1648 took up his abode at the court of Queen Christina of Sweden, but returned to Holland in 1658. In 1670 he settled in England, and here, although a scoffer and a libertine, was appointed by Charles II. a canon of Windsor. He died there in 1688, and it is recorded that on his death-bed he refused to take the sacrament until one of his colleagues argued that he ought to do so for the credit of the chapter.

He was the first to edit the six shorter epistles of Ignatius (1646). Other works were editions of the geographer Scylax, Justin, Pomponius Mela, and Catullus, besides contributions to chronology.

Vostitza, a Greek town on the Corinthian Gulf, 25 miles by rail E. of Patras; pop. 5311. The old name of *Aigion* is sometimes given to it.

Voters. See ABDUCTION, REGISTRATION, REPRESENTATION, PARLIAMENT.

Vow (Lat. *votum*), a voluntary promise made to God, and, as such, carrying with it the most stringent obligation to its fulfilment. Vows, as religious acts connected with the notion of sacrifice, were common to all the religions of antiquity. In Israel they were regarded at times as absolutely irrevocable—the vow of Jephthah is a case in point—but the laws of Leviticus provided for their commutation or redemption by money (Lev. xxvi.). The practice of vows did not cease in apostolic times (Acts, xviii. 18; xxi. 23), and in the later and mediæval church the system received a very extensive development. The Protestant churches,

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by a reaction against the abuse of monastic vows, discarded the practice altogether. In the Roman Church, however, vows are held to be of divine institution and intimately connected with the most perfect state of the Christian life. A vow is defined by Catholic theologians to be a promise to God *de meliori bono*—i.e. the matter or object of the vow must be, in moral worth, superior to its opposite. Thus, a vow to marry would be ordinarily null, for the married state is not considered to be in itself better than the unmarried. Vows are mostly concerned with the evangelical counsels as distinguished from the precepts of the Christian law, and with acts of supererogation or of conduct not otherwise obligatory. But a vow to observe a precept gives to it a greater moral value, invests its observance with the character of divine worship, and obtains for it higher merit. Certain important vows, the vow of chastity, of entering a religious order, or making pilgrimage to the Holy Sepulchre, to Compostella, &c., are 'reserved to the pope'—i.e. cannot be dispensed from except by authority from the holy see. Otherwise the making of simple vows is left to the discretion of the individual, and dispensation from them for a just cause can be obtained from the bishop or religious superior. The church, however, takes under her special charge, or is said in a solemn manner to accept certain vows which on that account are called *solemn* as distinguished from *simple* vows. The three solemn vows of poverty, obedience, and chastity, involving complete and irrevocable surrender, essentially constitute the 'religious' state. A solemn vow of poverty deprives the subject of all dominion over property. More important is the distinction in reference to the vow of chastity. A simple vow of chastity renders subsequent marriage illicit but not invalid, while a solemn vow nullifies marriage. Yet all monks and nuns do not take solemn vows. In certain newly-instituted communities, and in some countries where the civil legislation interferes with the observance of these vows in their integrity, simple vows are taken. By recent papal decrees simple vows are substituted at least for a period even in the older orders. In the Society of Jesus a certain select number only after many years are admitted to the three solemn vows, and to these vows is then added a fourth, of special obedience to the pope. By a peculiar exception, however, the vow of chastity taken by a Jesuit after his noviciate, though a simple vow in other respects, is made to annul marriage. It should be noted that a priest at his ordination makes no explicit vow of chastity; but the celibacy to which he is bound is treated canonically as a vow, implied in his acceptance of sacred orders. A vow differs from a promissory oath inasmuch as the oath is said to merely call God to witness to the reality or sincerity of the *promise* at the time it is made. The neglect to fulfil it is commonly thought to contract no greater guilt than what is already involved in the non-fulfilment of the natural promise.

The casuistry of vows is treated in all works of moral theology. But see especially the latest editions of Ferraris, *Bibliotheca* (art. 'Votum').

Vowel. See LETTERS, PHONETICS, VOICE.

Vranja, a town of Servia, in the portion ceded by Turkey in 1878, 60 miles S. of Nisch by rail. Pop. (1890) 11,399.

Vryburg, capital of British Bechuanaland, near one of the head-streams of the Vaal River (a tributary of the Orange), and 145 miles N. of Kimberley by rail (1890). Pop. 5000.

Vulcan, the old Italian god of fire, confounded with the Greek Hephæstus (q.v.).

Vulcanite. See INDIA-RUBBER.

Vulcano. See LIPARI ISLANDS.

Vulgate, the edition of the Latin Bible which, having been sanctioned by the usage of many ages in the Roman Church, was pronounced 'authentic' by the Council of Trent. The name was originally given to the 'common edition' of the Septuagint used by the Greek Fathers, and thence transferred to the 'Itala' or the 'Old Latin' version of both Old and New Testaments current during the first centuries in the Western Church. It finally passed to the present composite work, which gradually took the place of the 'Old Latin.' The relation of the component parts of this venerable version to the original texts will be best understood by a description of the work of St Jerome, from whose hand it mainly proceeded. In the time of Pope Damasus, towards the end of the 4th century, the text of the 'Old Latin,' the origin of which is lost in obscurity, had fallen into considerable confusion. It was a very literal representation of the Greek, rude in style and full of provincialisms. Every one, it seems, who had a smattering of Greek, thought fit to make alterations; and so great became the variety of recensions that it is still a matter of dispute whether there was not at their basis a number of independent translations rather than a single version often retouched. To remedy the evil Jerome, at the request of Damasus, 382 A.D., undertook a revision of the New Testament. He corrected the Gospels thoroughly, though with great caution, and the rest more cursorily, with the aid of Greek codices which were then reputed ancient and trustworthy. The critical value of the result as a primary witness to the Greek text in its best state in the 4th century has recently been generally recognised. Jerome next turned his attention to the Psalms. He at first merely corrected the Latin from the 'common edition' of the Greek, and this revision, called the 'Roman Psalter,' completed in 383, was introduced by the pope into the Roman liturgy, and is to this day used in the Ambrosian or Milan rite and in St Peter's at Rome. Shortly afterwards Jerome made a more thorough revision by the aid of Origen's Hexapla; and it is this, the so-called 'Gallican Psalter,' which is now read in the Vulgate. The rest of his revision of the 'Old Latin' does not concern us here, as it forms no part of the present Vulgate, and indeed has, with the exception of the Book of Job, entirely perished. After the death of Damasus Jerome was induced by the urgency of private friends to undertake a more serious task, a new translation of the Old Testament from the Hebrew. This he accomplished in Palestine, where he had perfected himself in Hebrew with the assistance of learned Jews, during the years 390–405 A.D. To this work he added a free translation of the books of Tobit and Judith from the Chaldee version of the original Hebrew, now lost. The other books of the Greek canon, afterwards incorporated with the rest of his work—viz. Wisdom, Ecclesiasticus, and Maccabees—were left by him untouched; and these, with, in a somewhat less degree, the Psalms and the New Testament, are of especial value to the linguist, preserving as they do, quite apart from their Grecisms, many lexical and grammatical forms, relics of the dialect of the people, which are not found in the classical or literary language. The new translation met at first with much opposition. The Fathers had been accustomed to regard the Septuagint as an inspired version, and Jerome's departure from that version appeared to be a dangerous innovation. It won its way by degrees, and by force of its intrinsic worth. Gregory the Great says that in his time the Roman see made use of both versions. Venerable Bede speaks of St Jerome's as '*our* edition;' and soon the 'Old Latin' fell into disuse and neglect, so that, notwithstanding the keen researches of scholars, a complete

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copy of the pre-Hieronymian Old Testament cannot now be made up from the surviving fragments.

In the course of the middle ages the Vulgate necessarily contracted some corruption. Charlemagne, with the aid of Alcuin, took pains to procure and disseminate a pure text; and later on, with the same object, the university of Paris and some of the religious orders compiled *Correctoria*, or lists of common errors with their corrections. The numerous editions printed in the 15th century were of no critical value, but in the first half of the following century several attempts were made to provide a revised and authoritative text, the most important editions being those of R. Stephens (1528, and later) and of the Louvain theologians (first under the care of Henten of Malines in 1547, and secondly with the co-operation of Lucas of Bruges and the printer Plantin, 1574). Meanwhile the carrying out of the Tridentine decree, that the Vulgate should be printed as correctly as possible, was undertaken by the popes, who appointed commissions of cardinals and learned men for the purpose. Nearly forty years passed, however, before their labours were brought to a close. Sixtus V. in 1590 first issued the long-expected work, together with a bull in which he ordered this edition to be received as 'true, lawful, authentic, and unquestioned;' but he had of his own judgment made many important changes in the readings proposed by the commission, and these met with so little approval that the edition was after Sixtus' death almost immediately recalled, the work again submitted to a papal congregation for revision, and finally issued in 1592 as the authoritative text by Clement VIII. This Clementine Bible differed from the Sixtine in some 3000 readings. A few errors of the press were corrected in a second impression in 1593; and others, again, in the third and last official impression of 1598, to which standard all copies should be conformed.

The precise import of the term 'authentic' applied to the Vulgate has been much discussed by Roman theologians. It is, however, clear that the council intended to make no comparison of the Vulgate with the original texts, but, considering it to be convenient that, among the several *Latin versions* then current, one should be guaranteed as authentic—i.e. substantially representing the original, and free from all error in faith or morals—declared the Vulgate edition tested by long usage within the church to be such. The Vulgate thus defined to be an authentic version could not be the particular Clementine edition, which was not then in existence, but the Vulgate generically, or in its purest form. Although the official text is capable of improvement, it is agreed by the best judges that the Clementine editors made use of ancient manuscripts with discernment, and proceeded throughout on sound critical principles.

The best general history of the Vulgate is that of Kaulen, *Geschichte der Vulgata* (Mainz, 1868). The fullest account in English will be found in Westcott's article in Smith's *Dictionary of the Bible*. Several codices and fragments of the 'Old Latin' were published in the Benedictine Sabatier's *Vetus Italica* (3 vols. folio, Paris, 1751) and in the fine work of the Oratorian Bianchini, *Evangeliarium Quadruplex* (2 vols. folio, Rome, 1748). Many other manuscripts have been published separately by Tischendorf, E. Ranke, and others. See especially *Old Latin Biblical Texts*, published since 1891, by Bishop John Wordsworth. The character of the Latinity of the pre-Hieronymian texts has been fully investigated by Rönsch, *Itala und Vulgata* (Marburg, 1869), and by Ziegler, *Lateinische Bibelübersetzungen vor Hieronymus* (1879). The *Codex Amiatinus*, the principal manuscript of the Hieronymian Vulgate, highly valued by the Clementine editors, has been published, the New Testament by Tischendorf (Leipzig, 1854) and Old Testament by Heyse and Tischendorf (Leip. 1873). The work done by the Roman Congregations has been well brought to light by Ungarelli, *Dissert. de N. T. et Historia Vulg. Edit. à Conc. Trident.* (Rome, 1847), and by Vercellone, *Dissertazioni accademiche* (Rome, 1864). The various readings of ancient Vulgate manuscripts have been critically examined by the same Vercellone in his two volumes, *Variæ Lectiones* (Rome, 1860–64), an important work, which unfortunately was carried no further than to the end of the Book of Kings. The variations between the Sixtine and Clementine editions have been treated controversially by Cox in his *Bellum Papale*, but more thoroughly in the rare work of Bukentorp, *Lux de luce* (Colonia, 1710). All that can be said of the imperfections of the Vulgate in relation to the original texts will be found in Sixtini Amama, *Anti-barbarus Biblicus* (1656).

Vulpius, CHRISTIANE. See GOETHE.

Vulture, any member of the family Vulturidæ included among the Birds of Prey in the sub-order Falcones. By some naturalists the family is subdivided into the Old-World vultures (Vulturinæ) and the New-World vultures (Sarcorhamphinæ), while by others the latter, which are distinguished by a perforated nostril and the absence of an 'after-shaft' to the feathers, are regarded as a distinct family, Cathartidæ. In all the vultures the head and neck are more or less bare, the beak is long and curved only at the tip; the legs and feet are large and powerful, but the toes and claws are relatively weak. They are thus well adapted for walking and feeding on the ground, but are unable to carry off their prey like the eagles and hawks. The wings are very strong, and their powers of swift and sustained flight are remarkable. Vultures are widely distributed throughout temperate and tropical regions, and the general habits of the various species are very similar, though they differ greatly in their choice of haunts. Thus one species frequents the rocky peaks of the Alps and another sweeps over the great plains of Africa; the King Vulture

The King Vulture (*Sarcorhamphus papa*).

dwells alone with his mate in the densest parts of the South American forests, while Pharaoh's Chickens pick up a living as street scavengers in the towns of the East. The chief food of the vultures is carrion; they rarely attack any living animal unless under great stress of hunger, when a wounded or feeble lamb or hare is sometimes killed. There has been much discussion as to whether vultures scent or sight their prey, but experiment has shown, apparently conclusively, that their sense of smell is not unusually acute, and that they rely chiefly on their extreme keenness of vision, while the sudden descent of one bird serves as a signal to many others. When a

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carcass is discovered by one, others arrive quickly on the scene from all points of the compass, though none may have been visible a few minutes before. Tearing off the skin with their powerful beaks they gorge themselves greedily on the flesh and

Egyptian Vulture (*Neophron percnopterus*).

entrails till nothing is left but the skull and larger bones. Smaller birds only venture to look on and watch for stray morsels which may be let fall, but in the neighbourhood of towns the vulture's claim is sometimes—not often successfully—disputed by wandering dogs. After a full meal vultures may remain without food for many days. The young birds, which are carefully tended for several months, are fed by regurgitation of food from the crop of the parents. One of the commonest European species is the Griffin Vulture (*Gyps fulvus*), which occurs in Spain, among the Alps, and in the Mediterranean region generally. It makes a rough nest of branches and grasses, usually in a cavity or on a ledge of an almost inaccessible cliff. One or at most two eggs are laid early in March, and the parents share the labour of rearing and tending the young. The adult bird measures 3½ feet in length; the general colour is light brown with black markings, and there is a white ruff on the lower part of the neck. The Eared Vulture (*Otogyps auricularis*), an inhabitant of Africa, receives its name from folds of skin on the head resembling ear-lappets. The Egyptian Vulture (*Neophron percnopterus*) is often called Pharaoh's Chicken from its frequent occurrence in ancient Egyptian hieroglyphics, where it is used as an emblem of parental love. It is very common throughout northern Africa and Persia, and breeds frequently in the south of Europe. More than one specimen has been killed in England. The Egyptian vulture is raven-like in form; its wings are pointed, its bill slender, and half covered with a naked cere. The adult bird is little over 2 feet in length; its plumage is white with black wing-feathers. The young birds are dark brown. Some account of the New-World vultures will be found in the article CONDOR.

Vulturnus (mod. *Volturno*), a river of Campania, on whose banks stood the city of *Vulturnum*—both names that often occur in Roman history.

Vyasma, a town of Russia, 110 miles ENE. of Smolensk by rail. Pop. 13,148.

Vyatka, capital of a Russian government on the river Vyatka, 280 miles NE. of Nijni-Novgorod. Pop. 24,998, largely engaged in the corn-trade and in making wax and tallow candles. The area of the government (59,117 sq. m.) is much larger than that of Roumania. Pop. 2,914,344.

Vyernyi. See SEMIRETCHINSK.

Vyrnwy, a river which rises on the borders of Merioneth and Montgomery and joins the Severn 8½ miles above Welshpool. By engineering operations, begun in 1881, the waters of the upper Vyrnwy have been impounded for the water-supply of Liverpool; and when the new supply was laid on, 14th July 1892, there was an artificial lake of 1121 acres, 4¾ miles long by 1½ broad, and containing 2103 million cubic feet of water. The retaining wall consists of cyclopean stones, is 100 feet high, and is sunk 60 feet below ground. By the track the water follows, the distance is 68 miles from Liverpool.

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W

the twenty-third letter of our alphabet, is, like *æ*, a ligature rather than a letter, as is implied by the name, *double u*. In very early West Saxon MSS. the sound is represented by *uu*, a digraph for which the North-umbrian rune ƿ, called *wen*, was substituted, and not entirely dis-used till the 13th century, except in Anglo-Norman MSS., such as Domesday Book, where the French scribes used *uu* for medials, and for initials the capital form VV, which, when ligatured, became our W. The sound, which is nearly that of the Greek digamma and of the Roman consonantal V, is produced by rounding the lips as in uttering *u*, and at the same time contracting the aperture and drawing in the cheeks, so that the breath cannot escape without friction. When the sound is voiced we have *w*, as in the words 'we' or 'wen,' the corre-sponding unvoiced sound being *wh*, as in 'when,' 'which,' or 'what.' The A.S. *hw* has now become *wh*, the aspiration being almost lost in southern English, but in the north the old sound has been preserved, and we still hear *hwich* and *hwat* instead of 'which' and 'what.' In the old combination *wr* the symbol *w* has been preserved, but its sound has been lost, as in the words 'wright,' 'wrench,' 'wrong,' 'wrist.' The combination *cw* has become *qu*, as in 'quoth' from *cwæth*, 'queen' from *cwén*, and 'quench' from *cwencan*. The *w* is occasionally intrusive, as in 'whole' from *hál*, and 'whore' from *hóre*. The intrusive *w* is probably due to analogy, and is useful as distinguishing the words from the homophones 'hole' and 'hoar.' A final *w* is vocalic, as in 'few' and 'new,' where the spellings are survivals from the A.S. *feáwa* and *níwe*, in which *w* was a consonant. Here the con-sonantal sound has been lost, owing to the loss of the final colliding vowel. The lips were rounded to pronounce *u*, and then contracted to pronounce the following vowel, and when this disappeared only the sound of *u* was left. So in the French *oui* the sound of *w* is produced by rounding the lips to pronounce *ou* (our *u*), and then narrowing them for the *i*. We find *w* in a few modern French loan-words, such as 'whist' and 'whisky,' but the sound is usually represented by *ou*, as in 'Edouard.' In old French loan-words an initial *w* was represented by *gu*, as *Guillaume* for William. In modern Welsh a vocalic *w*, when short, has the sound of *oo* in 'good;' when long, of *oo* in 'boon.'

Waagen, DR GUSTAV FRIEDRICH, a well-known art-critic, born at Hamburg in 1794, and died at Copenhagen, 15th July 1868.

Waal, an arm of the lower Rhine (q.v.).

Wabash, capital of Wabash county, Indiana, on the Wabash River, 89 miles by rail NNE. of Indianapolis, with machine and sash works, rail-way-shops, &c. Pop. 5105.—The Wabash River rises in western Ohio, flows across Indiana, then turns south and separates it for 200 miles from Illinois, and falls into the Ohio River after a course of 550 miles. The Wabash and Erie Canal, which also passes the town, is the longest (476 miles) in the States. It runs from Toledo, Ohio, to Evans-ville, Indiana.

Wace (no authority for the common prænomen Robert), a celebrated Anglo-Norman poet, born in Guernsey most probably about 1100, enjoyed the favour of the Norman kings of England, was given by Henry II. a prebend at Bayeux, and died about 1175. His two long romances, the *Geste des Bretons* or *Brut* and the *Roman de Rou*, are among the best monuments of Norman French in point of language, and even literature. The former (ed. by Leroux de Lincy, 2 vols. Rouen, 1836–38) is a free versification of the History of Geoffrey of Monmouth. The *Roman de Rou* is a history of the Dukes of Nor-mandy down to 1107, three-fourths of its 16,000 verses written in octosyllabic verse rhyming in pairs (ed. by Pluquet, Rouen, 1824; more adequately by Dr Hugo Andresen, 2 vols. Heilbronn, 1877–79).

Wace, HENRY, theologian, was born in London, 10th December 1836, and educated at Marlborough, Rugby, King's College, London, and Brasenose College, Oxford, graduating in 1860 with a second-class in both classics and mathematics. He served curacies at St Luke's and St James's; was lecturer of Grosvenor Chapel, chaplain of Lincoln's Inn (1872–80), when he became its preacher; and acted as professor of Ecclesiastical History in King's College (1875–83). In 1881 he became a prebend-ary of St Paul's, in 1883 chaplain to the Arch-bishop of Canterbury and principal of King's Col-lege. He was Boyle lecturer—*Christianity and Morality*—(1874–75), Bampton lecturer—*The Foun-dations of Faith*—(1879), and was select preacher at Cambridge (1878), at Oxford (1880–82), honorary chaplain to the Queen (1884), and chaplain-in-ordinary (1889). His name is best known as the joint-editor with Sir W. Smith of the great *Dictionary of Christian Biography* (4 vols. 1877–87), and as himself the editor of the *Speaker's Com-mentary on the Apocrypha* (2 vols. 1886).

Other books are *The Gospel and its Witnesses* (1883), *Student's Manual of the Evidences of Christianity* (1886), *Some Central Points of Our Lord's Ministry* (1890).

Waco, 'the geyser city' of Texas, capital of McLennan county, on the Brazos River, crossed by a suspension bridge, 186 miles by rail NW. of Houston. It is the seat of Baylor University, contains female and commercial colleges, boasts sixteen warm artesian wells (104° F.), manufactures woollens, mattresses, and sadlery, and has a large trade in country produce. Pop. (1890) 14,445.

Wadai, a state of the central Soudan (q.v.), between Bagirmi and Dar-Fûr, with a pop. of from 3 to 6 millions; capital, Abesher.

Wadding, LUKE, historian of the Franciscan order, was born at Waterford, 16th October 1588, studied at Lisbon, became a Franciscan and pro-fessor at Salamanca. In 1618 he settled in Rome, where he founded a college of Irish Franciscans, and wrote the *Annales Ordinis Minorum* (8 vols. 1626–40; new ed. 1731–47) and the *Scriptores Ordinis Minorum*, besides editing Duns Scotus. He died 18th November 1657.

Waddington, WILLIAM HENRY, French statesman, was born in Paris, 11th December 1826,

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son of a naturalised English cotton manufacturer. He had his education at Rugby and Trinity College, Cambridge, and took a classical first-class, with a Chancellor's medal, in 1849. And more English still, he was notable in football at Rugby, and rowed No. 6 in the university boat-race of 1849, when Cambridge won. He next returned to France, and devoted himself to the study of antiquities, extending his journeys to Asia Minor, Syria, and Cyprus. In 1865 he was elected to the Academy of Inscriptions and Belles Lettres. In February 1871 he was returned by Aisne to the National Assembly, giving a steady support to Thiers. From 1876 till 1885 he sat as senator for Aisne. He served as minister of Public Instruction in 1873 (for a few days only) and in 1876–77, as minister of Foreign Affairs (1877), plenipotentiary at the Berlin Congress (1878), president of the Council (1879), and was ambassador at London from 1883 to 1892.

Wade, GEORGE, field-marshal, was born in 1668, obtained his first commission in the Engineers in 1690, and rose to be lieutenant-general of the Ordnance and a member of the Privy-council. During the critical period of the pacification of the Highlands after 1715 he commanded the royal forces in Scotland, and assisted in disarming the clans; and to him is due the execution (1720–30) of the great military roads through the Highlands, some of which have continued to be the main lines of communication. He also suppressed a riot in Glasgow, and repaired Edinburgh Castle. In 1744 he commanded in the Netherlands, and returned in 1745 to be at the head of the royal forces in Yorkshire during the Rebellion. His army was the first evaded by the Pretender on his southward march. General Wade died 14th February 1748.

Wade, SIR THOMAS FRANCIS, Chinese diplomatist and scholar, was born in 1818, educated at Harrow, entered the army in 1838, and served till 1847. Chinese secretary at Hong-kong in 1855, he was attached to the missions of Lord Elgin and Sir Frederick Bruce (1857–61), became Chinese secretary to the Legation at Pekin in 1862, and in 1871 minister plenipotentiary there, being made K.C.B. in 1875.

Wadelai, a town on the Upper Nile, 40 miles N. of the Albert Nyanza. Emin Pasha made it one of the fortified stations of his Equatorial Province, and at one time his principal residence.

Wading-birds. See BIRDS, GRALLÆ.

Wadset, the earliest form of giving security in land in Scotland; superseded by the modern Bond and Disposition in Security. See HERITABLE.

Wady, an Arabic word signifying a river, a river-course, a ravine, or valley. See NAMES, p. 378.

WADY HALFA is a place (pop. 3500) on the right bank of the Nile, just below the second or great cataract. After the reorganisation of Egypt after the Soudanese rebellion this was taken as the southward limit of Egypt. It is named from a gorge where halfa grass or Esparto (q.v.) grows.

WADY MUSA is the modern name of PETRA.

Wafers, thin discs of dried paste, mostly coloured, used for attaching papers together, and formerly for sealing letters. They are made by mixing fine wheaten flour with water and any non-poisonous colouring materials, so as to form a mixture not thicker than thin cream. A small quantity of this is poured on one of a pair of steel plates, each 15 inches by 10 inches, which form the head ends of a large pair of tongs or pincers, and have their inner surfaces well polished. The act of closing the plates on each other spreads the paste into a thin sheet which, while held between them, is partially baked by turning the blades for a brief time over a fire. The newly-baked sheets are too brittle to form wafers, so that they require to be placed for a little while in a damp cellar to absorb moisture. This dulls the glaze on their surface, but it is restored by pressing them between sheets of tinplate in a screw-press. A dozen sheets of the prepared paste are now piled on each other, and an operator with a hand punch, the size of a single wafer, cuts out twelve or more at a blow, and repeats the operation till the whole of the pile is punched. One person can make a large number of wafers, and the number of workmen now engaged in their manufacture in Great Britain probably does not exceed half a dozen. See also HOST.

Wager, in English law, means a promise to give money or money's worth on the happening of an uncertain event. Every contract of insurance is in the nature of a wager, but such contracts are permitted, because they serve useful purposes. Sporting wagers were enforceable at common law, unless they were of an indecent or otherwise improper character: thus, a wager on the life of Napoleon was held void, as tending to weaken the patriotism of an Englishman, and to encourage the assassination of a foreign sovereign. By an Act of 1845 all agreements by way of wagering are rendered null and void *as between the parties;* but the enactment does not apply to any subscription for a prize to be awarded to the winner in any lawful sport. Where a person employs an agent to bet for him, or to enter into transactions contrary to Leeman's act (passed to prevent gambling in shares), no action can be brought on the bet or bargain made by the agent; but if the agent pays, the principal remains liable to indemnify him. These rules apply to all wagers; but there are certain forms of agreement which are not only void but illegal. Acts were passed in 1665 and 1710 to discourage betting on games, and an Act of 1835 provides that any security given for a gambling debt shall be void, and that money paid to the holder of such security may be recovered by action. As the loser of a bet cannot be legally compelled to pay, the debt is only what is called a debt of honour; but sporting men are usually more scrupulous in paying such debts than in meeting the claims of their lawful creditors. By the criminal law penalties are imposed on persons who keep or use houses for betting purposes, and magistrates may authorise the police to break into such houses and arrest persons found therein. Persons who win money by cheating at cards, &c. are liable to be indicted for obtaining money by false pretences; persons playing or betting in the street may be punished as rogues and vagabonds. See Anson, *Law of Contract*, for a clear statement of the law relating to wagers. In the law of Scotland wagers are treated as *pacta illicita*, and debts incurred by wager are not enforced. In the United States gaming contracts are in most states void, and money paid or property delivered on such considerations may generally be recovered back. In 1892 an act was passed rendering it penal to incite infants (below the age of 21), by means of circulars, advertisements, letters, telegrams, or otherwise, to bet, wager, or borrow money—the penalty being fine or imprisonment with or without hard labour. See BETTING.—For Wager of Battle, see BATTLE.

Wages, the part of produce which goes to the labourer. The 'wages-fund' theory formulated by Mill is that as there is at any given time in a country a determinate amount of capital available for the payment of labour, therefore the average wage depends on the proportion of this fund to the number of persons who have to share in it. Ricardo's 'iron law of wages,' taken in connection with his theory of Rent (q.v.), is generally somewhat exaggerated by socialists into the doctrine

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that wages cannot exceed what is absolutely necessary for the maintenance of the labourer (see LASSALLE); really his teaching was that the labourers cannot for any considerable time earn more than is necessary to enable their class to live in the degree of comfort which custom has rendered indispensable, and to perpetuate their race. But for the controversies on wages, reference must be made to the works cited at POLITICAL ECONOMY, to MARX and SOCIALISM, to Walker's *Wages Question* (1877), and to Leone Levi's *Wages and Earnings of the Working Classes* (1885). See also ARRESTMENT, CAPITAL, LABOUR, MASTER AND SERVANT, TRADE UNIONS, TRUCK-SYSTEM.

Waghorn. See OVERLAND ROUTE.

Wagner. Richard Wagner's personality has been so overshadowed by and almost merged in the great controversy which his schemes of reform in opera raised that his life and character are often now sorely misjudged—just as his music long was—by those who have not the time, the inclination, or the ability to understand the facts and the issues. Before briefly stating then the theories he propounded and their development, as shown in successive music dramas, it will be well to summarise the story of a life (1813–83) during which he was called to endure so much vicissitude, trial and temptation, suffering and defeat.

Born in Leipzig on the 22d May 1813, the youngest of nine children, Wilhelm Richard was only five months old when his father died. His mother's second marriage entailed a removal to Dresden, where, at the Kreuzschule, young Wagner received an excellent liberal education. At the age of thirteen the bent of his taste, as well as his diligence, was shown by his translation (out of school hours) of the first twelve books of the *Odyssey*. In the following year his passion for poetry found expression in a grand tragedy. 'It was a mixture,' he says, 'of Hamlet and Lear. Forty-two persons died in the course of the play, and for want of more characters I had to make some of them reappear as ghosts in the last act.' Weber, who was then conductor of the Dresden opera, seems to have attracted the boy both by his personality and by his music, but it was Beethoven's music which gave him his real inspiration. From 1830 to 1833 many compositions after standard models are evidence of hard and systematic work, and in 1833 he began his long career as an operatic composer with *Die Feen*, which, however, never reached the dignity of performance till 1888—five years after Wagner's death. After some time spent in very unremunerative routine work in Heidelberg, Königsberg, and Riga (where in 1836 he married), he resolved in 1839 to try his fortune in Paris with *Rienzi*, a new opera, written on the lines of the Paris Grand Opera and with all its great resources in view. From the month's terrific storm in the North Sea, through which the vessel struggled to its haven, till the spring of 1842, when Wagner left Paris with *Rienzi* unperformed and heartsick with hope deferred, his lot was a hard and bitter one. Berlioz in similar straits supported himself by singing in the chorus of a second-rate theatre; Wagner was refused even that humble post. In 1842 *Rienzi* was accepted at Dresden, and its signal success led to his appointment as Kapellmeister there (January 1843). In the following year the *Flying Dutchman* was not so enthusiastically received, but it has since easily distanced the earlier work in popular favour. The story was suggested to his mind during the stormy voyage from Riga, and it is a remarkable fact that the wonderful tone-picture of Norway's storm-beaten shore was painted by one who till that voyage had never set eyes on the sea. In 1845 his new opera, *Tannhäuser*, proved at first a comparative failure. The subject, one which had been proposed to Weber in 1814, attracted Wagner while he was in Paris, and during his studies for the libretto he found also the first suggestions of *Lohengrin* and *Parsifal*. The temporary failure of the opera led him to the consideration and self-examination which resulted in the elaborate exposition of his ideal (in *Opera and Drama* and many other essays). 'I saw a single possibility before me,' he writes, 'to induce the public to understand and participate in my aims as an artist.' *Lohengrin* was finished early in 1848, and also the poem of *Siegfrieds Tod*, the result of Wagner's studies in the old Nibelungen Lied; but a too warm sympathy with some of the aims of the revolutionary party (which reigned for two short days behind the street barricades in Dresden, May 1849) rendered his absence from Saxony advisable, and a few days later news reached him in Weimar that a warrant was issued for his arrest. With a passport procured by Liszt he fled across the frontier, and for nearly twelve years the bitterness of exile was added to the hardship of poverty. It is this period which is mainly responsible for Wagner's polemical writings, so biting in their sarcasm and often unfair in their attacks. He was a 'good hater;' one of the most fiendish pamphlets in existence is the *Capitulation* (1871), in which Wagner, safe from poverty (thanks to the kindness of Liszt and the munificence of Ludwig II. of Bavaria) and nearing the summit of his ambition, but remembering only his misfortunes and his slights, gloated in public over the horrors which were making a hell of the fairest city on earth. There is excuse at least, if not justification, to be found for his attacks on Meyerbeer and others; there are considerations to be taken into account while one reads with humiliation and pity the correspondence between Wagner and his benefactor Liszt; but it is sad that an affectionate, humane, intensely human, to say nothing of an artistic nature, could so blaspheme against the first principles of humanity.

In 1852 the poem of the *Nibelungen Ring* Trilogy was finished. In 1854 *Rheingold* (the Introduction or *Vorabend*) was ready, and *Die Walküre* (part i.) in 1856. But 'tired,' as he said, 'of heaping one silent score upon another,' he left *Siegfried* unfinished, and turned to the story of *Tristan*. The poem was completed in 1857, and the music two years later. At last in 1861 he received permission to return to Germany, and in Vienna he had the first opportunity of hearing his own *Lohengrin*. For three years the struggle with fortune seems to have been harder than ever before, and Wagner, in broken health, had practically determined to give up the unequal contest, when an invitation was sent him by Ludwig II., the young king of Bavaria. 'Come here and finish your work.' Here at last was salvation for Wagner, and the rest of his life was comparatively smooth. In 1865 *Tristan und Isolde* was performed at Munich, and was followed three years later by a comic opera, *Die Meistersinger*, the first sketches of which date from 1845. *Siegfried* (*Nibelungen Ring*, part ii.) was completed in 1869, and in the following year Wagner married Cosima, the daughter of Liszt, and formerly the wife of Von Bülow. His first wife, from whom he had been separated in 1861, died at Dresden in 1866.

A theatre built somewhere off the main lines of traffic, and specially constructed for the performance of Wagner's later works, must have seemed the most impracticable and visionary of proposals in 1870; and yet, chiefly through the unwearying exertions of Carl Tausig (and after his death of the various Wagner societies), the foundation-stone

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of the Baireuth theatre was laid in 1872, and in 1876, two years after the completion of the *Götterdämmerung* (*Nibelungen Ring*, part iii.), it became an accomplished fact. The first work given was the entire Trilogy; and in July 1882 Wagner's long and stormy career was magnificently crowned there by the first performance of *Parsifal*. A few weeks later his health showed signs of giving way, and he resolved to spend the winter at Venice. There he died suddenly, 13th February 1883, and was buried in the garden of his own house Wahnfried at Baireuth.

Wagner's life and his individuality are of unusual importance in rightly estimating his work, because, unlike the other great masters, he not only devoted all his genius to one branch of music—the opera—but he gradually evolved a theory and an ideal which he consciously formulated and adopted, and perseveringly followed. It may be asked whether Wagner's premises were sound and his conclusions right; and also whether his genius was great enough to be the worthy champion of a cause involving such revolutions. Unless Wagner's operas, considered solely as music, are not only more advanced in style, but worthy in themselves to stand at least on a level with the greatest efforts of his predecessors, no amount of proof that these were wrong and he right will give his name the place his admirers claim for it. It is now universally acknowledged that Wagner can only be compared with the greatest names in music. His instrumentation has the advantage in being the inheritor of the enormous development of the orchestra from Haydn to Berlioz, his harmony is as daring and original as Bach's, and his melody is as beautiful as it is different from Beethoven's or Mozart's. (These names are used not in order to institute profitless comparisons, but as convenient standards; therefore even a qualification of the statement will not invalidate the case.)

His aim (stated very generally) was to reform the whole structure of opera, using the last or 'Beethoven' development of instrumental music as a basis, and freeing it from the fetters which conventionality had imposed in the shape of set forms, accepted arrangements, and traditional concessions to a style of singing now happily almost extinct. The one canon was to be dramatic fitness. In this 'Art Work of the Future,' as he called it, the interest of the drama is to depend not entirely on the music, but also on the poem, and on the acting and staging as well. It will be seen that Wagner's theory is not new. All or most of it is contained in the theories of Gluck and others, who at various periods in the development of opera consciously strove after an ideal music drama. But the times were not ripe, and therefore such music could not exert its proper influence. The twin arts of music and poetry, dissociated by the rapid advance of literature and the slow development of music, pursued their several paths alone. The attempt to reunite them in the end of the 16th century was futile, and only led to Opera (q.v.) which never needed, and therefore did not employ, great poetry. In Germany music was developed along instrumental lines until the school arrived at its culmination in Beethoven; and when an opera composer stopped to think on the eternal verities the result must always have been such a prophecy of Wagner's work as we find in Mozart's letters:

> *October*, 1781.—Verse indeed is indispensable for music, but rhyme is bad in its very nature. . . . It would be by far the best if a good composer, understanding the theatre and knowing how to produce a piece, and a clever poet, could be united in one. . . .'

Other, but comparatively unimportant, features in the Wagner music drama are, e.g., the use of the *Leitmotiv* or Leading Motive—found occasionally in Gluck, Mozart, Weber, &c., but here first adopted with a definite purpose, and the contention for mythological rather than historical subjects—now largely admitted. But all Wagner's principles would have been useless without the energy and perseverance which directed his work, the loving study which stored his memory with all the great works of his predecessors, and above all the genius which commands the admiration of the musical world.

Wagner's works show a remarkable and progressive development. *Rienzi* is quite in the grand opera style of Meyerbeer, Spontini, &c. The *Flying Dutchman* is a deliberate departure from that style, and in romantic opera strikes out for itself a new line, which, followed still further in *Tannhäuser*, reaches its stage of perfection in *Lohengrin*. From this time dates the music drama, of which *Tristan* is the most uncompromising type, and which by virtue of wonderful orchestration and the intense pathos of the beautifully-written poem is the most fascinating of all. The Trilogy (*Walküre*, *Siegfried*, *Götterdämmerung*, with the *Rheingold* as introduction) is a very unequal work. It is full of Wagner's most inspired writing and most marvellous orchestration; but it is too long and too diffuse. The plot also is strangely confused and uninteresting, and fails alike as a story and as a vehicle of theories, morals, or religion. *Parsifal*, with its sacred allegory, its lofty nobility of tone, and its pure mysticism, stands on a platform by itself, and is almost above criticism, or praise, or blame. The libretto alone might have won Wagner immortality, so original it is and perfect in intention; and the music seems to be no longer a mere accessory to the effect, but the very essence and fragrance of the great conception.

The Wagner literature is enormous, and varies from immoderate enthusiasm to fanatical hatred. The best life on the whole is that of Adolphe Jullien, *Richard Wagner: sa Vie et ses Œuvres* (1886); Mr Dannreuther's exhaustive article in Grove's *Dictionary* is temperately written. See also Francis Hueffer, *Richard Wagner and the Music of the Future* (which attracted much notice in 1874) and *Richard Wagner* ('Great Musicians' series, 2d ed. 1883); *Correspondence, 1841–61, between Wagner and Liszt* (Eng. trans. by Hueffer, 2 vols. 1888); *Wagner's Letters to Dresden Friends* (Eng. trans. 1890); Gustav Kobbe, *Wagner's Life and Works* (New York, 1890); A. R. Parsons, *Parsifal: R. Wagner as Theologian* (1891); Ferdinand Praeger, *Wagner as I knew Him* (1892); the Lives by Wolzogen, Pohl, and others; also 'Studies in Modern Opera' by the present writer in the *Monthly Musical Record* (1892–93). Wagner's works, which fill 10 vols. (Leip. 1871–83; new ed. 1888), have been partly translated by Hueffer and Dannreuther.

Wagner, Rudolf, physiologist (1805–64), professor successively at Erlangen and Göttingen, and author of *System of Physiology* (Eng. trans. 1844) and *Comparative Anatomy* (trans. 1845).

Wagram (*Deutsch-Wagram*), a village 10 miles NE. of Vienna, where, on the 5–6th July 1809 the Austrians were defeated by Napoleon (q.v.).

Wagtail, a family (Motacillidæ) and a genus (Motacilla) of Passerine birds. The family, which includes the true wagtails and the Pipits (q.v.), is distinguished from the thrushes, warblers, crows, shrikes, waxwings, and starlings by the absence of the bastard or first primary; from the finches by the slenderness of the bill; from the swallows by the slenderness of the bill and the greater length of the legs; and from the larks, probably its nearest allies, by having the tarsus scutellated only in front, and having an additional spring moult, which, however, does not extend to the quills and tail-feathers. In distribution it is almost cosmopolitan, being absent only from the Polynesian subregion. It is most abundantly represented in the Palæarctic, Ethiopian, and

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Oriental regions; least so in the Nearctic, only one species of wagtail entering the New World, but pipits being more represented.

The genus Motacilla, the true wagtails, includes about thirty species, of which eight are European and five British. They frequent open and well-cultivated districts, where they are found on banks of streams and ponds and in pastures. They are almost exclusively terrestrial in habits, and run

Pied Wagtail (*Motacilla yarrelli*).

gracefully and swiftly along the ground, constantly jerking the long tail up and down. Their flight is very undulatory; they have little power of song. Their food consists of insects and small shellfish. Their nests are built in holes in rocks or on the ground. The Pied Wagtail (*M. yarrelli* or *lugubris*) is from 7 to 8 inches long, and has beautifully-marked white and black plumage. It is found all over the western part of Europe, and is generally distributed as a resident throughout the British Islands, visiting and nesting in the extreme north of Scotland and, sparingly however, in the Hebrides and Orkneys, and known in the Shetlands and St Kilda on its spring and autumn migrations. Although a British resident bird it is partially migratory, especially in the northern districts; even in England there is a general movement northwards in spring and southwards in autumn. It breeds in April, the nest being made of moss, dry grass and roots, and placed in a hole in a bank, wall, rock, tree, or even in an open field. The cuckoo often selects this nest in which to lay her egg. The young differs considerably from the old bird in plumage. This species was long confounded with the White Wagtail (*M. alba*), found over the whole of Europe, northern Asia, India, Burma, and North Africa, occurring not uncommonly in England, more rarely in Scotland, and very rarely in Ireland. In general habits, food, and haunts it closely resembles the pied wagtail, but it has been known to breed in the burrow of a sand-martin. The Gray Wagtail (*M. melanope* or *boarula*), the Yellow Wagtail (*M. rayi*), and the Blue-headed Wagtail (*M. flava*) are the other British species. A variety of this last occurring in Alaska is the only true wagtail found in the New World. Cuvier classed wagtails with yellow coloration in a genus Budytes; and for the gray wagtail Kaup established the genus Calobates.

Wahâbis, a puritanical sect of Moslems, whose political influence, widely felt over the Mohammedan world, centred from the beginning in Nejd (see ARABIA, Vol. I. p. 364). The founder's aim was to restore primitive Mohammedanism. He disapproved the superstitious veneration of Mohammed, denounced magnificence in mosques, ceremonies, or personal attire, the use of spirituous drinks or tobacco, usury, card-playing, &c., and insisted on sexual purity, almsgiving, daily prayer, &c. After the break-up of the Wahâbi power by Mehemet Ali and Ibrahim Pasha the survivors fled into the central deserts of Arabia, whence they have occasionally since emerged in threatening force. Thus in 1828 they made war (unsuccessfully) with the Porte, and in 1863 extended their domain again to the Persian Gulf. Now they are confined to the neighbourhood of El Riâd. There are a considerable number of Wahâbis in India, though they hesitate to describe themselves as such to the authorities, having been always fanatical enemies of British influence, and repeatedly (as in 1863–64) guilty of treasonable intrigues. Patna is their main centre in India. They hold themselves aloof both from Shîites and Sunnites, though in faith they are substantially Sunnite.

See Corancez, *Histoire des Wahabys* (1810); Burkhardt, *Notes on the Bedouins and Wahabys* (1834); the travels in Arabia of Palgrave, Doughty, Pelly, &c.; and Sir W. W. Hunter, *Our Indian Musalmans* (1871).

Wahsatch Mountains. See UTAH.

Waigatz, or VAIGATCH. See NOVA ZEMBLA.

Waikato, the principal river of the North Island of New Zealand, flows first into Lake Taupo, and then out of it northward to Manakan Harbour, with a total course of 170 miles. Between the upper Waikato, Lake Taupo, Mount Ruapehu, and the west coast lies the mountainous and picturesque 'King Country,' occupied mainly by Maoris under their king, who until 1884 resolutely opposed the survey or settlement by Europeans of the lands within their *aukati* or frontier.

Wainewright, THOMAS GRIFFITHS, essayist, forger, and poisoner, was born at Chiswick in October 1794. Left an orphan, he was brought up at Turnham Green by his grandfather, Dr Ralph Griffiths (1720–1803), the founder of the *Monthly Review*, and was educated under Charles Burney. He had held a commission in the Guards when, about 1820 or earlier, he took to writing tawdry art criticisms and miscellaneous articles for the periodicals, especially the *London Magazine*. He married on £200 a year, and, soon outrunning his means, first committed a forgery (1824), and then poisoned with strychnine his uncle (1829), his mother-in-law (1830), a sister-in-law (1830), and a Norfolk acquaintance at Boulogne (1831). The sister-in-law (Wainewright's wife was an accomplice in her murder) had been fraudulently insured for £18,000, but two actions to enforce payment failed; and Wainewright, venturing back from France to London in 1837, was arrested for his old forgery, and sentenced to life transportation. Even in Newgate he bragged of still holding 'the position of a gentleman,' and in Van Diemen's Land canted about 'Art and the Ideal.' There he painted portraits, ate opium, and at last died of apoplexy in Hobart Town hospital about 1852. The 'kind, light-hearted Wainewright' of Charles Lamb (1823) is depicted by 'Barry Cornwall' as short and fattish, 'with mincing steps and tremulous words, his hair curled and full of unguents, and his cheeks painted like those of a demirep,' a collector of richly-bound works on occultism and poisoning. He is the 'Varney' of Lytton's *Lucretia* (1846), and the 'Slinkton' of Dickens's *Hunted Down* (1860).

See his *Essays and Criticisms*, edited, with a memoir, by W. C. Hazlitt (1880), B. W. Procter's *Autobiography* (1877), and Oscar Wilde's *Intentions* (1891).

Waits, originally watchmen who sounded horns, and afterwards bands of musicians and singers, especially carol-singers at Christmas time.

Waitz, GEORG, historian, born at Flensburg, 9th October 1813, studied law and history at Kiel

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and Berlin, became professor at Kiel in 1842, member of the German National Assembly in 1848, and professor at Göttingen in 1849, where he formed an active school of young historians who devoted themselves especially to mediæval Germany. In 1875 he became member of the Academy in Berlin, and director of the reorganised *Monumenta Germaniæ historica*, and died 24th May 1886. To native acuteness of intellect Waitz added laborious industry, with the consequence that the permanent value of his work remains secure.

Here may merely be named *Deutsche Verfassungsgeschichte* (vols. i.–viii. Kiel, 1843–78), *Schleswig-Holsteins Geschichte* (2 vols. 1851–54), *Ueber das Leben und die Lehre des Ulfila* (1840), and *Grundzüge der Politik* (1862). Many papers of his appeared in the *Forschungen zur Deutschen Geschichte* (established 1860). Other works were on Dahlmann's *Quellenkunde zur deutschen Geschichte* (edd. 3–5), and an edition of Caroline Schelling's Letters (1871). See Steindorff, *Bibliographische Uebersicht über Georg Waitz's Werke* (1886), and Kluckhohn, *Zur Erinnerung an Georg Waitz* (1887).

Waitz, THEODOR, anthropologist, was born at Gotha, 17th March 1821, studied philology, mathematics, and philosophy at Leipzig and Jena, became a lecturer in 1844 at Marburg, and professor extra-ordinary of Philosophy in 1848, and died March 21, 1864.

His greatest work is the monumental *Anthropologie der Naturvölker* (vols. i.–iv. Leip. 1859–64; vols. v.–vi. by Gerland, 1870–71). The Anthropological Society of London published a translation of the first volume in 1863. Other works were *Grundlegung der Psychologie* (1846), *Lehrbuch der Psychologie als Naturwissenschaft* (1849), *Allgemeine Pädagogik* (1852), and a critical edition of the *Organon of Aristotle* (1844).

Waltzen (Magyar *Vácz*), a Hungarian town on the Danube, 20 miles N. of Pesth by rail, with a cathedral on the model of St Peter's. Pop. 13,199.

Wake. Lykewakes were in Scotland condemned by the General Assembly in 1645 and 1701, but survived this legislation in Aberdeenshire and the Highlands. See FUNERAL RITES.

Wake, WILLIAM, Archbishop of Canterbury (1716–37), was born at Blandford in Dorsetshire, in 1657, studied at Christ Church, Oxford, and was successively preacher to Gray's Inn, rector of St James's, Westminster, Dean of Exeter (1701), Bishop of Lincoln (1705), and Primate (1716), dying at Lambeth, 24th January 1737. Of great learning and industry, he has bequeathed his name to posterity in the *Genuine Epistles of the Apostolic Fathers* (1693). He maintains the authenticity of them all; but though his preliminary dissertation may be antiquated, the translations are still excellent. In these he was aided by Dr Johann Ernst Grabe (1666–1711), a native of Königsberg, who became a chaplain of Christ Church, Oxford, and edited the *Septuagint*, a *Spicilegium* of Fathers, Justin, and Irenæus.

Wakefield, the capital of the West Riding of Yorkshire, stands on the Calder at a convergence of railways, 9 miles SSE. of Leeds, 27 SSW. of York, and 19 NW. of Doncaster. In 1888 it was constituted the seat of a bishopric—its cathedral the fine Perpendicular parish church, which, enlarged and reconsecrated in 1329, and again enlarged about 1470, was restored in 1857–86 from designs by Sir G. G. Scott at a cost of £30,000, and has a tower and spire 227 feet high. On the eight-arch bridge over the Calder is an interesting chapel founded in 1357 by the townsmen of Wakefield, a building in the beautiful flowing Decorated style; it also was restored in 1847. At the grammar-school, chartered in 1591, and removed to new buildings on a different site in 1855, were educated Dr Radcliffe, Archbishop Potter, the Benedictine Cressy, and Bentley, the first two of whom were natives. The town-hall, French Renaissance in style, was erected in 1880 at a cost of about £72,000; and other buildings are the corn exchange, fine art institute, Clayton hospital, and lunatic asylum. Though not the great 'clothing town' it was formerly, Wakefield still has considerable manufactures of woollens, worsteds, and hosiery, as also of agricultural implements, machinery, &c. It was incorporated in 1626, and made a parliamentary borough in 1832, the boundary of the latter being extended in 1885. Pop. (1851) 22,065; (1881) 33,240; (1891) 37,269, of whom 33,146 were within the municipal area. The chief event in the history of Wakefield is the Yorkist defeat in the Wars of the Roses (q.v.) on 31st December 1460.

See works by Sisson (1824), Scatcherd (1843), Buckler (1843), Lupton (1864), Taylor (1886), Clarkson (1887), J. W. Walker (1888, 1890), and Peacock (1892).

Wakefield, a manufacturing town of Massachusetts, 10 miles N. of Boston. Pop. 6970.

Wakefield, EDWARD GIBBON, born in London 20th March 1796, was in 1826 imprisoned for abducting a young lady and marrying her at Gretna Green. During his imprisonment he studied colonial questions with zeal, and after his liberation assisted in the colonisation of South Australia. He was private secretary to Lord Durham in Canada in 1838, but is best known for his services to New Zealand colonisation as managing director of the New Zealand Association. He was one of the founders of the High Church colony of Canterbury, where he died, 16th May 1862.

Wakefield, GILBERT, divine, was born at Nottingham, 22d February 1756, and had his education at Jesus College, Cambridge, of which he became fellow. He took orders, but renounced the Anglican communion, laboured as classical tutor in dissenting academies at Warrington and Hackney, lay two years in Dorchester gaol for a so-called seditious libel in answer to Bishop Watson, for which his political friends consoled him with a gift of £5000, and died in London, 9th September 1801. He published editions of Bion and Moschus, Virgil, Horace, and Lucretius; *Christian writers of the three first centuries on the Person of Christ* (1784), left unfinished; *Inquiry into the expediency and propriety of social worship* (1791), the necessity for which he denied; *An Examination of Paine's Age of Reason* (1794); and *Silva Critica*, a collection intended to illustrate the Scriptures from the stores of profane learning (1789–95). His learning was wide, if nowhere profound or exact; but his warmth of temper proved a great source of weakness to him as a controversialist. After leaving the Church of England he never attached himself to any other religious society, although practically a Unitarian. In his *Diary*, H. C. Robinson says of him: 'He had the pale complexion and mild features of a saint, was a most gentle creature in domestic life, and a very amiable man; but when he took part in political or religious controversy his pen was dipped in gall.' His own *Memoirs* (1792) are uninteresting; not so his Correspondence with Fox (1813).

Wake-robin. See ARUM.

Wakhan. See BADAKHSHAN, AFGHANISTAN.

Walch, CHRISTIAN WILHELM FRANZ, was born at Jena in 1726, in 1754 became extra-ordinary, in 1757 ordinary, professor of Theology at Göttingen, and died 10th March 1784. His name survives in the durable worth of his contributions to church history: *Gedanken von der Geschichte der Glaubenslehre* (1756), *Entwurf einer Historie der Ketzereien, bis auf die Reformation* (11 vols. 1762–85), and *Neueste Religionsgeschichte* (9 vols. 1771–83).—His father, JOHANN GEORG WALCH (1693–1775), was

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long professor of Theology at Jena, edited Luther's works (24 vols. Halle, 1740–52), and wrote a work of great value on the history of the religious controversies within the Evangelical-Lutheran Church (5 vols. 1730–39), and its complement, on those without that church (5 vols. 1733–36).

Walcheren, an island in the Dutch province of Zeeland, at the mouth of the Scheldt, containing 52,000 acres and 45,000 inhabitants. The chief places are Middelburg, Flushing, and Campvere. One-half is meadow, the other rich arable land, well wooded to the north. Where it is not protected by natural dunes, strong dykes have been formed, that at West Kappelle being a magnificent work. The drainage-water is carried off by large sea-sluices at Middelburg and Vere. Agriculture is the principal employment. The people are chiefly Protestants. Several large artificial mounds are supposed to have been erected by the early inhabitants as places of refuge from high tides.

The *Walcheren Expedition*, one of the most disastrous failures in the history of modern warfare, was planned in 1807, when Britain, Prussia, Russia, and Austria were all in arms against France; but it was not till early in the summer of 1809 (when Napoleon, who had meantime overwhelmed Prussia, and reduced Russia to neutrality, was gradually forcing Austria to succumb) that the British ministry resolved to carry it out. The plan was to send a fleet and army up the Scheldt, and attack Antwerp (the principal naval station and arsenal of the French), whose fortifications, though formidable, were much in need of repair, and whose garrison at the time only numbered about 2000 Invalides and coast-guards; while there were not more than 10,000 French soldiers in Holland. The expedition, after numberless needless delays, at last sailed on July 28, and, to the number of 37 men-of-war, 23 frigates, 115 sloops and gunboats, accompanied by transports carrying about 41,000 soldiers, reached the Dutch coast on the following day. But, instead of obeying the orders of the minister of war, Lord Castlereagh (q.v.), to advance at once in force against Antwerp, the commander-in-chief, Lord Chatham (1756–1835), Pitt's elder brother, frittered away his time in the reduction of Flushing, which was not effected till August 16, by which time the garrison of Antwerp had been reinforced by King Louis Bonaparte with the troops at his command (about 6000), and by detachments sent from France, which swelled the garrison, by August 20, to 15,000 men. About the end of August Chatham, who, as a general, was a methodical incapable, 'found himself prepared' to march upon Antwerp, but by this time 30,000 men, under Bernadotte, were gathered to its defence, and the English army was decimated by marsh-fever, so that success was not to be hoped for. However, it was judged right to hold possession of Walcheren, in order to compel the French to keep a strong force on the watch in Belgium, and, accordingly, 15,000 remained to garrison the island, the rest returning to England; but the malaria proved fatal in its ravages, and, peace having been concluded between Austria and France, this force was also recalled. Thus an excellently devised scheme, through the utter stupidity of the agent chosen by George III. to carry it out, failed in every point of consequence, and ended in a loss of 7000 men dead, and the permanent disablement of half the remainder.

Waldeck, or WALDECK-PYRMONT, a small principality of Germany now controlled by Prussia, consists of two parts, Waldeck, between Westphalia and Hesse-Nassau, and Pyrmont, a small patch between Lippe, Westphalia, Brunswick, and Hanover. The country is high-lying and poor, with a total area of 438 sq. m. and a population of (1890) 57,283, of which 8104 belong to Pyrmont. The capital is Arolsen (q.v.). Pyrmont, 15 miles E. of Detmold (pop. 1500), lies in the valley of the Emmer, and has famous mineral springs. The arrangement by which Prussia took over all essentials of government except formal ones was made in 1867, and renewed in 1877 and 1887. Daughters of the princely house were married to the king of the Netherlands in 1879 and to the Duke of Albany in 1882.

Waldenses, a famous Christian community which originally grew out of an anti-sacerdotal movement originated by Peter Waldo of Lyons in the second half of the 12th century. A rich merchant, pious and unlearned, he caused the New Testament and a collection of extracts from the Fathers to be translated into Romaunt, and, naturally failing to find the apostolic simplicity in the ecclesiastical condition of the time, sold his movable goods for the support of the poor, and devoted himself to preaching the truth to the people by the wayside. Everywhere he found eager listeners, and was followed by groups of simple and earnest persons of both sexes who did their best, even to their dress, to carry out the apostolic ideal, loving to bear the name of the Poor Men of Lyons. The tenets ascribed to them in the earliest accounts are chiefly that oaths even in a court of justice are not allowable, that homicide is under no circumstances justifiable, that every lie is a mortal sin, that all believers are capable of priestly functions, and that the sacraments are invalidated by uncleanness of life in the officiating priest. We find at first no special doctrines that could be condemned as heretical, and even in later days, as Mr Lea points out, the documents of the Inquisition constantly refer to 'heresy and Waldensianism,' the former meaning Catharism. The Archbishop of Lyons forbade them to preach, but in vain; Pope Alexander III. gave them a modified approval, but Lucius III. anathematised them at Verona in 1184, and Innocent III. at the fourth council of the Lateran in 1215. But it was impossible to compel silence, for the missionary zeal of these sincere enthusiasts was boundless, and their influence quickly grew. Alonso II. of Aragon ordered them to quit his dominions in 1194, and in southern France they became involved in the common destruction of the Albigenses, although their quarrel with the church differed from that of the latter in relating to matters of practice rather than of doctrine. But under persecution their divergences from the church naturally grew ever the greater, and we find that gradually, though never uniformly, they came to repudiate the invocation of the Virgin and saints, transubstantiation, and purgatory with all its consequences. Thus the Waldensian martyrs at Strasburg in 1212 made no distinction between laity and priesthood, while at the same time both the French and Lombardian Waldenses held that the Eucharist could be celebrated only by an ordained priest, and it was at that time still the latter only who believed it invalid if the priest was living in sin. Yet they themselves maintained a kind of order of preachers (*perfecti*), living in voluntary poverty and celibacy, in contradistinction to the ordinary *credentes*. And by some accounts there was a kind of hierarchy among the *perfecti*, a theory which gains some support from the frequent use of such terms as *majoralis*, *magnus magister*, *major*, and *minor*. Their morality was austere, and we find the very inquisitors acknowledging their chastity, sobriety, truthfulness, and industry. Their crowning offences were their paramount regard for Scripture and the unresting proselytism of their preachers, who went abroad two by two, ostensibly practising some

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calling, as pedlars or tinkers, but ceaselessly exhorting the faithful in sequestered places, hearing confessions, and administering absolution. Their principal seats were the slopes and fastnesses of the Cottian Alps, east in Piedmont, west in Provence and Dauphiné. After the Cathari were finally crushed they supplied the chief work that remained to the Inquisition in France. They had grown strong among the poorer class in Languedoc, with schools, a good organisation, and missionaries reputed to have skill in medicine. They next spread into Lorraine, Burgundy, Franche Comté, Narbonne, and the mountains of Auvergne. We find Bernard Gui burning them at Toulouse in 1316, and by this time persecution had done its perfect work as well in refining their piety as in completing their estrangement from Rome. Their doctrine of non-resistance made it easy to harry and confiscate their property, yet we find the victims often too poor to pay for the wood that burned them. During the years 1336–46 especially they were severely harassed; twelve were burned in front of the cathedral at Embrun in 1348. Popes Clement VI. and Urban V. stimulated the zeal of the Inquisition, and we read how the fierce inquisitor, François Borel, burned 150 at Grenoble in one day in 1393. Gregory XI. urged on the unholy work in Provence, Dauphiné, and the Lyonnais, and in 1375 the prisons were crowded with far more prisoners than could be fed, and charity was actually asked for them by the church. During the Great Schism they contrived to escape, and after the Council of Constance the Hussites engaged for a time all the energies of the church. We hear, however, of the persecutions again in 1432 and later years, and by this time, says Mr Lea, so completely had the Waldenses monopolised the field of misbelief in the public mind of France that sorcery became popularly known as *vauderie*, and witches as *vaudoises*. Sixtus IV. tried to stir up Louis XI. in vain; but Charles VIII. was more docile, and Pope Innocent VIII. was able in 1488 to organise a crusade against them in both Dauphiné and Savoy. The valley of Pragelato, Val Cluson, and Freyssinières were ravaged pitilessly with fire and sword and wholesale confiscations, many *barbes* (pastors) were burned, and in Val Louise the poor fugitives were smoked to death in their caves. Louis XII. stopped the proceedings, with consent of Pope Alexander VI., whose son Cæsar Borgia had just received the duchy of Valentinois. Their remnants continued to cherish their own faith, more or less under disguise of Catholicism, until they finally merged with the Calvinists after the Reformation.

In Italy the Waldenses had found the ground prepared by the Arnaldistæ, or followers of Arnold of Brescia (q.v.), and Umiliati, and spread rapidly even in Milan, but especially in the valleys of the Cottian Alps, Luserna, Angrogna, San Martino, Perosa. Poor, hard-working labourers as they were, they showed throughout their history examples of constancy and quiet heroism such as the world has seldom seen. The Inquisition destroyed Catharism in Italy; Waldensianism it could not destroy. About 1312 in Luserna and Perosa, we are told, as many as 500 attended their assemblies. Popes John XXII., Urban V., and Gregory XI. urged on the persecution, yet all the terrors of fire and sword and torture could not tear them from their faith. In 1375 many of the wretched fugitives from Pragelato perished in the snow, among them as many as fifty mothers with children at the breast. Again in 1475 a bitter war of extermination began under the Duchess Yolande, regent of Savoy, and another, as has been seen, in 1488 at the instigation of Pope Innocent VIII. During the persecutions in Savoy many had found refuge in Calabria and Apulia, and about 1400 there was a larger emigration, as during the 15th century the Inquisition was virtually extinct in Naples. These outlying settlements were visited every two years by *barbes* journeying under some pretext, the distance between Pignerol and Calabria being counted twenty-five days' journey by the western coast.

The Cathari never made much way in Germany, but on the other hand the Waldenses became strong. Some were burned at Strasburg in 1212, and especially in the diocese of Passau in the second half of the same century there was much persecution. Yet by the close of the century they had become very numerous, often succeeding in escaping notice by their quietness and outward conformity. In 1392 the Archbishop of Mainz persecuted them vigorously, burning thirty-six at Bingen together. At Steyer in Pomerania, in 1397, over a hundred of either sex were burned. Yet they were not extirpated, and remained strong, especially on the confines between Austria and Moravia. In 1467 they united themselves with the famous Bohemian Brethren. The Waldensians on the French side of the Cottian Alps in 1530 opened negotiations with the Swiss and German reformers, and in 1532 a five days' synod at Chanforans in the valley of Angrogne drew up articles of agreement. The Provence congregations were persecuted pitilessly under Francis I. in 1545, twenty-two villages being burned, and 4000 persons massacred, while as many were driven into flight. In Piedmont they defended their rights with such heroism that Emanuel Philibert in 1561 was forced to grant them freedom of worship in the valleys of St Martin, Perosa, and Luserna. In 1571 they formed the 'Union of Valleys' to guard their rights against a government that could not be trusted. From May 1630 to July 1631 plague raged in these valleys and carried off over 10,000—one-half of the whole population. But still more cruel was the persecution, which seldom indeed gave a long respite, and burst out in 1655 with a ferocious brutality that called forth a significant protest from Oliver Cromwell and from Milton one noble sonnet. In 1601 the Duke of Savoy had driven as many as 500 families into exile; again in 1686 Amadeus II. with the help of French troops coerced many through terror into conversion, and drove the recusants into exile, as many as 2600 to Geneva alone, others to the Palatinate, Hesse, and Nassau. In August 1689 more than 800 of these exiles returned to their native valleys, suffering incredible sufferings on their way. Under their pastor Henri Arnaud they made a valiant struggle against the French, and were finally added to Savoy by the peace of Utrecht. The 18th century was not a favourable age for persecution, yet even at its close the Waldenses could hold no office nor real estate, nor have physicians of their own faith. Napoleon allowed their church a constitution, but this Victor Emmanuel abolished in 1814, although two years later, urged by England and Prussia, he issued a milder edict. Meantime they prospered—Colonel John C. Beckwith (1789–1862), who had lost a leg at Waterloo, through reading Dr Gilly's *Visit to the Valleys of Piedmont* (1823), settled amongst the people for the last thirty-five years of his life, marrying a peasant girl, and succeeded in establishing as many as 120 schools. At last in 1848 Charles Albert gave the Waldenses equal political and religious rights, and since that time their progress has been constant if not rapid. In 1889–90 they had in Italy 44 churches and 53 stations, 58 pastors and evangelists, and a theological school at Florence.

Morland, Cromwell's emissary to Piedmont in 1658, brought back many Waldensian MSS. in Romaunt, which

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were lost and only rediscovered in the Cambridge University Library in 1862. (See H. Bradshaw in the *Memoirs* of Camb. Antiq. Soc., 1862, and Archdeacon Groome in *Christian Advocate and Review* for January 1863). The prose consists of translations from Scripture and the Fathers, and sermons; the finest thing in the poetry is the *Nobla Leyczon*, an exhortation to good works. Gradually the Waldenses conceived a kind of mythical idea of the continuity from primitive times of their scheme of doctrine, and naturally this compelled them to push back the origin of their community until actually they came to regard theirs as the real mother of the Reformed Churches. The origin of their name was no longer found in Peter Waldo, but in the Lat. *valles*, the valleys which had sheltered the true faith from the Apostolic age. Their historical documents were interpolated and falsified to suit the requirements of this historical theory, which indeed was long accepted by the Protestant world, and only disproved by Dieckhoff, *Die Waldenser im Mittelalter* (1851); Herzog, *Die Romanischen Waldenser* (1853); Todd, *Discourses on the Prophecies relating to Antichrist* (1840); and Maitland, *Facts and Documents of the Waldenses* (1862). See the *Bulletin de la Société d'Histoire Vaudoise* appearing yearly in Torre Pellice; and of more modern books, especially Émile Comba, *Histoire des Vaudois d'Italie* (vol. i. 1887; Eng. trans. 1889); Édouard Montet, *Histoire Littéraire des Vaudois du Piémont* (1883); K. Müller, *Die Waldenser bis zum Anfang des 14 Jahrhunderts* (Gotha, 1886); Henry C. Lea's *History of the Inquisition of the Middle Ages* (3 vols. New York, 1887); and A. Bérard, *Les Vaudois, leur Historie du IV^e^ au XVIII^e^ Siècle* (1892). See the bibliographies appended to the articles in Herzog and in Holtzmann-Zöpffel.

Waldo. See WALDENSES.

Wales, a great peninsula in the west of the island of Britain, bounded by the Irish Sea, St George's Channel, and the Bristol Channel, and touching the (now English) counties of Cheshire, Shropshire, Hereford, and Monmouth. The area is 7363 sq. m., about a fifth larger than Yorkshire. The principality of Wales, administratively a part of England, though differing more or less widely in blood, language, national character, and religious temper, is a mountainous land, and contains Snowdon (q.v.), the highest point in South Britain; North Wales is especially picturesque. The minerals are extremely valuable, and South Wales contains some of the most important coal and iron industries in the United Kingdom. Copper, zinc, lead, tin, and gold are also found. The physical geography, geology, climate, &c. have been already discussed at GREAT BRITAIN, where physical and geological maps of Wales will be found. For the political map, see that of England; the representation is shown at PARLIAMENT, p. 778. The established church is a part of the Church of England, with four episcopal sees; Nonconformists, especially Calvinistic Methodists, Congregationalists, Baptists, and Wesleyans, are very numerous, and claim to be a large majority of the total population; but the proportions are much disputed. There are university colleges at Aberystwith, Bangor, and Cardiff, and theological colleges at Lampeter, &c. See the articles on the several Welsh counties, and on the towns such as Cardiff, Swansea, &c. The following table shows the area and population of the twelve Welsh counties:

County.	Area in acres.	1881.	1891.
Anglesey	198,511	51,416	50,079
Brecknockshire	460,158	57,746	57,031
Cardiganshire	443,387	70,270	62,596
Carmarthenshire	594,405	124,864	130,574
Carnarvonshire	369,477	119,849	118,225
Denbighshire	425,088	111,957	117,950
Flintshire	161,807	80,441	77,189
Glamorganshire	516,959	511,433	687,147
Merionethshire	384,717	51,967	49,204
Montgomeryshire	495,089	65,710	58,008
Pembrokeshire	391,181	91,824	89,125
Radnorshire	276,552	23,528	21,791
Total	4,712,281	1,360,505	1,518,914

History.—The population of Wales contains Brythonic elements mixed with Goidelic and Ivernian or pre-Celtic, probably pre-Aryan (see CELTS). The Silures of Glamorgan and Brecknockshire and east to the Severn were probably Goidelic; so were the Demetæ of Dyfed or west South Wales, but more strongly Ivernian; the Gangani and Decanti of North Wales were mainly Ivernian. Between these were the Ordovices (Orddwy), Brythonic, in the Upper Severn valley. During the Roman occupation Brythonic tribes seem to have encroached on the Goidels and Ivernians; and the Brythons appear to have become largely Latinised. Christianity had been introduced before the end of the 2d century, and extended beyond Roman territory. During the Roman occupation invaders from beyond the North Sea had already given trouble; the south-east of the present England was administered by the 'Count of the Saxon Shore;' the remaining territory, where Goidels and Ivernians had to be dealt with, was under the 'Duke of the Britains,' from southern Scotland to Land's End. When the Romans had gone, the *Dux Britanniarum* was succeeded by a Gwledig, who ruled over the tribes in the whole of his district, both Brythonic, Goidelic, and Ivernian, the ruling race being Brythonic. A common name for the people of this district was introduced, meaning 'fellow-countrymen,' *Combroges*, or, in modern form, *Cymry*, which survives in the names *Cumberland* and *Cambria*. *Wales* is from *Wealas*, 'foreigners,' the name given by the Anglo-Saxon invaders to the natives of Britain (compare the German *Wälsch*, used of things Italian and French). Saxon invasions did not for some time much affect this western district; but at length disturbances in the north drove Cunedda Wledig, the ruler of the district, away from the Forth valley where his seat was. He migrated to North Wales, waged war with the Goidelic tribes and expelled them from the Dee to the Teifi, Brythonising the country, except in the north-west corner. This resisted the process for some time, but at length, before 500 A.D., became Brythonic or Welsh in language, though Goidelic and Ivernian legends and traditions long lingered there. In South Wales the Demetæ were hard pressed by the same influence, and squeezed into the modern Pembrokeshire by about 600. The Demetæ of Dyfed and the Silures of Morganwg do not appear to have been conquered, but they were Brythonised; and the Gaelic language thus disappeared from Wales. At the same time Christianity was energetically spread by Cunedda's descendants, of whom many are found in the lists of Welsh saints—e.g. St David Christianised the Ivernian (or Pictish) Menavia (now St Davids), and founded a see there. The Gwledigship, more or less reduced to a shadowy claim of over-lordship over all the tribal chiefs, remained with the descendants of Cunedda, who were princes or kings of Gwynedd, Venedotia, or North-west Wales.

In 577 Ceawlin took Bath, Cirencester, and Gloucester, and thus separated the Britons of Cornwall from those of Wales. In 655 Cadwaladr, in alliance with Penda of Mercia, was defeated, and Penda slain, by Oswiu at Winwædfield. Strathclyde and Cumberland were separated by this battle from Wales. About 720 we find Cadwaladr's grandson, Rhodri (Roderick) Maelwynawg ab Tudwal, leading the Welsh chiefs; and he kept Saxondom at bay until 754, when he died. After his death his two sons quarrelled about Anglesey, while the Welsh chieftaincies fell asunder. From 757 to 795 Offa of Mercia scourged the Welsh; in 795 was the still-remembered battle of Rhuddlan marsh; Shrewsbury and Hereford became English centres; and Offa's Dyke was built from Flintshire to the

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Wye. In 768 the church in Gwynedd conformed to the Roman time of keeping Easter, but remained heterodox as regards the celibacy of the clergy. During the 9th century Wales was sorely troubled with Danish invasions. It was for Wales a century of misery, in which, however, Rhodri Fawr (Roderick the Great) succeeded in bringing all the chiefs under one head for some time. Towards the end of the century the Welsh chiefs all came successively under the protection of King Alfred, and the 10th century began quietly. Hywel Dda of Dyfed (Pembrokeshire), and probably of Powys (Upper Severn and Dee), codified the Welsh laws, based on the tribal system. The end of the 10th century was miserable; internecine strife aggravated and encouraged the attacks of the English and of the Danish sea-rovers. In 1039 Gruffydd ap Llywelyn became king of Gwynedd, and after very varying fortune became in 1055 king of all Wales, except perhaps Morganwg (Glamorganshire). When he destroyed the settlements of Edward the Confessor's Norman friends in Herefordshire, there were no reprisals, but Gruffydd submitted to King Edward. He afterwards broke the peace, and was defeated in 1063 by Harold and Tostig at Rhuddlan; Wales was vehemently attacked, and Gruffydd was murdered by his own people. Wales then submitted from sheer exhaustion.

After 1066 Welsh and English co-operated against William, but in vain; in 1070 William seized Chester; in 1071 Chester was made the centre of a palatine earldom under Hugo de Avranches, and Shrewsbury of one under Roger de Montgomery; in 1072 we find a vassal of Earl Hugh's in Rhuddlan, building Rhuddlan Castle, and Hugh de Montgomery across the Plynlimmon range, harrying north Cardiganshire, while Montgomery Castle was being built. Rival claimants to Welsh princedoms call in Norman aid, while the Black Danes are still, in 1080, invading Dyfed and Anglesey, and attacking Bangor. In 1081, by the battle of Carno (Montgomery) the rightful heirs of Gwynedd and South Wales, Gruffydd ap Cynan ap Iago and Rhys ap Tewdwr, a descendant of Roderick the Great, rescued their provinces from a usurping Trahaiarn, prince of Powys. Between 1081 and 1084 the Norman Conquest extended over Monmouthshire, Cardiff and Radnor castles were built, and William entered Wales. Under William Rufus the boundary line was pushed as far back as the Neath River in Glamorganshire, Brecknockshire (Brycheiniawg) was seized, and Earl Hugh of Chester gained a footing in Anglesey. In 1093 Rhys ab Tewdwr was killed by the Brecknock Normans, and so Pembroke and Cardigan were laid open; nothing was left but the mountain country of North-west Wales.

In 1094 a general rising took place; the castles in Gwynedd were seized; the Normans were expelled from Anglesey, and they lost Montgomery Castle; and in 1095 William Rufus marched in person as far as Snowdon, but with no success. In 1096 Monmouthshire and Brecknockshire were retaken, and the Normans by this time held only Glamorganshire and Pembroke Castle. In 1097 William led two more unsuccessful expeditions into Wales. After 1097 the tide turned; in a short time the Normans had their castles again in their hands. From 1100 onwards, under the politic Henry I., districts of country were allotted to the Welsh leaders under conditions of homage and service. Gruffydd ap Cynan growing too strong in Gwynedd among his mountains, Henry led an expedition against him in 1114, and Gruffydd was obliged to agree to a peace; Gwynedd thereafter began to prosper in agriculture, building, and wealth generally, though Gwynedd and Powys (under Cadwgan) were at strife. In South Wales, where in 1111 Henry had planted colonies of Flemings in Pembrokeshire and Gower to strengthen the Norman stations, Gruffydd ap Rhys ap Tewdwr asserted his heirship to the princedom; but though he gained some considerable successes, Wales was reduced to quietness by an expedition under Henry in 1121.

After the death of Henry I. in 1135, there was a wide-spread revolt, and the men of Gwynedd took Carmarthen. Even such districts as Radnorshire were lost by the Normans; under Stephen the royal power had ceased, and the lords marchers or border barons had become simply rival robbers. The Welsh leaders are found operating as far east as Flintshire, in Chester territory, and building a castle at Oswestry. By 1157 we find Gwynedd, under Owain, extending from Flintshire to Towyn (Merioneth); Powys, under Madoc ap Maredudd, extending far down towards Shropshire; and South Wales, under Rhys, from Aberdovey to Kidwelly; but internecine strife still continues. In 1157 Henry II. leads an expedition into Wales; Madoc of Powys assists him; Owain of Gwynedd is victorious by sea, but defeated by land, and submits; Rhys of South Wales then submits, and suffers loss of lands. Much land was distributed among Norman chiefs, and many diplomatic Norman-Welsh marriages made. Rhys ere long, deprived of sundry lands by force, rose in revolt; he maintained himself till 1162; then submitted to a strong expedition sent against him, aided by the men of Gwynedd; but in 1163 all Wales was in unanimous revolt. Henry's struggle with Becket had begun, and the Welsh expectation of the return of Arthur had become general. In 1165 an extraordinary but unsuccessful effort was made by Henry; and afterwards, being engrossed in his struggle with Becket, he treated the Welsh chiefs as ordinary feudal barons, and allowed them to fight out their own disputes. On this footing the Welsh chiefs swore homage and fealty to Henry, and Rhys of South Wales assisted him against his sons' revolt.

In ecclesiastical matters, the Welsh bishops repudiated the claims of the see of Canterbury, the see of St Davids being considered an archbishopric; but in 1203 the Welsh bishops were enjoined to obey the see of Canterbury. In 1194 Llywelyn ab Iorwerth, the rightful heir, became prince of Gwynedd, upsetting Henry's arrangements of 1170; in 1212 he, in alliance with other princes, attacked the Normans in Powys and Gwynedd, and rapidly extended his conquest during John's struggle with his barons; in 1217 he did homage to Henry III.; in 1219 he had become 'Prince of all Wales,' holding his own, and helping the barons against Henry III.; in 1238 he exacted an oath of fealty to his son Dafydd from the leaders of Wales; and he died in 1240. Dafydd was beleaguered (1245) in Snowdonia by Henry. In 1246 Dafydd was succeeded by Owain and Llywelyn ap Gruffydd, his nephews, who at first surrendered their lordships to Henry; Edward, Henry's young son, cruelly ruled over them, and a successful revolt resulted; in 1258 there was a Welsh-Scottish alliance against Henry III.: Llywelyn, who helped Simon de Montfort against Henry, obtained from Simon the fullest acknowledgment of his entire independence as 'Prince of Wales' saving the homage to the English crown, and this was confirmed by Henry even after the battle of Evesham. But Edward I., after bearing with seizures of certain lands by Llywelyn, delays in reference to homage and certain money payments, appeals to Rome and Canterbury, and an offer of homage to France, declared Llywelyn a rebel in 1276; excommunication followed; and Llywelyn was forced to submission in 1277. In 1281 he broke out again, but was killed near Builth in 1282. In 1283 his brother

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Dafydd was executed as a traitor. In 1283 the Statutes of Rhuddlan were passed, retaining Welsh law, modified, organising the government of Wales, and diminishing the too independent power of the Norman barons.

In 1284 Edward II. was born in Carnarvon town, and made Prince of Wales in 1300–1. For several years there were various brief insurrections, some with French assistance. In 1400 Owain ab Gruffydd Fychan, or Owain Glyndyfrdwy, Owain of the Glen of Dee or Owen Glendower, incensed by an encroachment on the part of Lord Grey de Ruthyn, took arms. Henry IV. took the field against him in vain; in 1401 unconscionably severe proscriptive laws ('Ordinances of Wales') were passed against Welshmen: Sir Henry Percy (Hotspur), Justiciary of Chester, was put in command; Owain raided the Severn valley in 1402 as far as Leominster; Henry IV. invaded Wales, but was driven back by extraordinary storms: Owain was recognised as 'Prince of Wales' at Machynlleth in 1402. Thereafter he sided against Henry IV., and allied himself with Hotspur and others for a partition of the kingdom. Henry IV. marching against the Scots, turned aside and intercepted Hotspur marching south, defeating him near Shrewsbury, 1403. Owain, who was in South Wales at the time, was left in possession during 1404, and made an alliance with Charles VI. of France in 1405. He suffered two defeats, in Monmouth and Brecknockshire, in 1405; when French assistance arrived, it could be of little use, and retired. The English entered Wales, but were again driven back by bad weather. Owain fell back in power, and in 1415 he died in obscurity, still holding out; Rhys ab Tewdwr, his associate in the rebellion, and Rhys's brother Meredydd having been executed for treason in 1412. Meredydd's son Owain married Catherine, the widow of Henry V.; their grandson, Henry Tudor, became Henry VII., to the great delight of Wales, which now believed it saw all Myrddin's (Merlin's) prophecies fulfilled, and the British race again ruling in Britain.

By 27 Henry VIII. chap. 26 (A.D. 1536) Wales was incorporated with England, with English laws and liberties; in 1689 the lords marchers' surviving anomalous jurisdiction (with a Lord President and Council at Ludlow) was abolished; in 1831 the Welsh judiciary (Court of Great Sessions) was incorporated in the judicial system of England. During the Cromwellian struggle Wales was strongly Royalist, and at a later period Jacobite in sympathy. The most striking features of its subsequent history have been the rise of Nonconformity and its recent intellectual awakening.

See Prof. Rhys's *Celtic Britain*; Woodward's *History of Wales* for the mediæval history; a sketch by Prof. Lloyd in the *Eisteddfod Transactions*, 1884 (Liverpool: I. Foulkes), of which we have made free use; Mr Tout's article on Wales in the *Dictionary of English History*; the Marquis of Bute's Presidential Address at Rhyl Eisteddfod, 1892; Henry Owen's *Gerald the Welshman* (London: Cymmrodorion Society); Rees's *Nonconformity in Wales*; and also the references in J. R. Green's works; Hubert Lewis's *Ancient Welsh Laws*; Stephens' *Literature of the Kymry*; and John E. Southall's *Wales and her Language*. For Welsh topography may be consulted works by Pennant (ed. by Rhys, 1883), Borrow (1862), and Wirt Sykes (South Wales, 1882). See also EISTEDDFOD, MADOC, REBECCA RIOTS.

LANGUAGE AND LITERATURE.—For the relations of the various Celtic tongues, see CELTS. Of the surviving Celtic languages, Welsh shows by far the most vigorous signs of life. It is spoken generally throughout Wales and Monmouthshire, and by thousands of Welshmen in the large towns of England, and in America and the colonies; and as it is written phonetically, there are very few of its speakers who cannot also read it. About twenty weekly newspapers are published entirely in Welsh, as well as fifteen or twenty monthly magazines, two bi-monthly reviews, and one quarterly. Two Welsh weekly papers and several monthlies appear in America. Abstracts of acts of parliament and other parliamentary papers having reference to Wales are regularly published in Welsh by government, and of late whole acts have been translated and published, including the Local Government Act, 1888. Welsh is taught in Oxford and at the university colleges of Wales; and now, after a long trial of the policy of ignoring it, it is being introduced into Welsh elementary schools.

The Welsh alphabet consists of twenty-seven letters—*a*, *b*, *c*, *ch*, *d*, *dd*, *e*, *f*, *ff*, *g*, *ng*, *h*, *i*, *l*, *ll*, *m*, *n*, *o*, *p*, *ph*, *r*, *s*, *t*, *th*, *u*, *w*, *y*. The consonants *b*, *d*, *h*, *l*, *m*, *n*, *p*, *ph*, *s*, *t*, *th* are pronounced as in English; *c* and *g* are always hard; *r* is trilled; *ch* is the German *ch* in *nacht*; *dd* is the soft *th* in *breathe*; *f* is the English *v*, *ff* the English *f*; *ng* is pronounced as in *sing*; *ll* bears the same relation to *l* that hard *th* does to soft *th*; *a*, *e*, *i*, *o* are pronounced as in Italian; *w* is the *w* in *wind*, or the *oo* in *book*; *u* is a peculiar sound approaching the English *e* in *pretty*; *y* has a sound approaching *i* in *fir*, except in the final syllable and in monosyllables, where it is pronounced as the Welsh *u*.

Zeuss, in his *Grammatica Celtica*, published in 1853, first proved that the Celtic group of languages belongs to the great Aryan or Indo-European family; and from that time it has become increasingly evident that it is closely connected with the Italian group. An idea of the relation between them may best be formed by a comparison with the Latin declensions of the Proto-Celtic declensions as restored by Dr Whitley Stokes. It is certain that when Cæsar landed in Britain the Brythonic language was highly inflected; and probably the Goidelic differed but little from it.

The importance of Welsh to the Celtic philologist is due to the fact that in the Roman period it borrowed a very considerable number of words from the Latin. Knowing the forms of these words at that period, and in mediæval and modern Welsh, we are able to deduce from them the laws of phonetic change, by which the Brythonic of that period has been transformed into modern Welsh. So that, given a pure Welsh word in its modern form, it is generally possible with some degree of confidence to restore it into the form which it had in old Brythonic.

The oldest forms of Welsh are preserved in inscriptions written in Roman characters and in Ogam (q.v.). The inscriptions, however, contain little beyond a few proper names. A number of glosses and some scraps of writing are preserved in manuscripts of the 9th century; and in these the final syllable of the Roman period has completely disappeared, but vowel-flanked consonants are still written hard. The oldest connected piece of Welsh writing of any length still existing is the Black Book of Carmarthen, a manuscript of the end of the 12th century. But several poems, whose composition must be referred to a much earlier date, are found in manuscripts of the 13th and 14th centuries. Phonetically the language of these poems is that of the date of the manuscripts; but this is only what is to be expected, for in existing manuscripts it is seen that everything is modernised at every successive transcription.

The most important of these ancient works is the *Gododin* of Aneurin, a poem of considerable literary merit, commemorative of the heroes who fell at the battle of Cattraeth, and written in the 6th century,

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probably not long after the date of that battle. It is preserved in a manuscript of the later part of the 13th century, and is about 1000 lines in length. Next in importance perhaps are the works of Llywarch Hên, who wrote *The Hall of Cynddylan*, and an elegy on Urien, one of the heroes of Cattraeth. The other poets of that period are Taliesin and Myrddin (Merlin, q.v.); but most of the poems attributed to these are spurious.

This early period of literary activity was followed by a long period of decline. But with the 12th century there came a great literary revival. The Mabinogion and the romances of Arthur, which had long hovered formlessly in the air as folklore, now crystallised and took literary shape. 'It was in the year 1145,' writes Mr Alfred Nutt (*Studies in the Legend of the Holy Grail*, p. 229), 'that Geoffrey of Monmouth first made the legendary history of Britain accessible to the lettered class of England and Continent. . . . Twenty years had not passed before the British heroes were household names throughout Europe, and by the close of the century nearly every existing literature had assimilated and reproduced the story of Arthur and his Knights.' In England the early English literature was forgotten, and exercised practically no influence on the English literature of the middle ages, which derived its inspiration and the greater part of its materials from the Arthurian sagas (*The Arthurian Legend*, by Prof. Rhys, p. 289).

The poetry of this period of revival is chiefly heroic. In the early part of the 12th century Meilir composed his ode in memory of Gruffudd ap Cynan; then came Gwalchmai, one of whose odes has been done into English verse by Gray; and then, about the end of the century, Cynddelw, the richness of whose vocabulary makes him difficult to understand now, on account of the number of words that have become obsolete. We must not omit to mention Llywarch ap Llywelyn, the bard of Llywelyn the Great, and Gruffudd ap Maredudd, whose lament on the death of Gwenhwyvar of Anglesey is one of the finest things of its kind in the language. This period, which may be called the period of the Princes, came to an end with the death in 1282 of Llywelyn ap Gruffudd, the last Prince of Wales.

In the early years of the 14th century a new period was ushered in by Rhys Goch ap Rhiccert, who wrote a number of sweetly musical love-songs. He was immediately followed by Davydd ap Gwilym, and the bards of the three Eisteddfods called those of the renascence ('y tair eisteddfod ddadeni'). In the poetry of the new revival love takes the place occupied 'by war in the older poetry; and the 'cywydd' metre of seven syllables takes the place of the longer heroic metre. Dafydd ap Gwilym, the greatest poet of this period, which has been called the golden age of Welsh literature, was born of noble parents in 1300. A welcome guest at every mansion in Wales, he travelled much throughout the length and breadth of the land. He met Morfudd, the daughter of Madawg Lawgam, at Newborough in Anglesey; and she became his Laura, to whom he inscribed seven score and seven songs. As a poet of nature he has perhaps no equal in English literature; he is certainly not approached by any one before Wordsworth. He knows every bird and every flower, and they all reveal to him their secrets. His descriptions of natural objects are not the mere conventional formulas of Chaucer, but the spontaneous expression of a profound first-hand knowledge of the things themselves. He died in 1368. Iolo Goch, one of the younger bards of the 'tair eisteddfod,' lived to write fiery odes to Owen Glendower. In 1451 Dafydd ab Edmwnd rearranged the metres, and perfected the rules of alliterative versification; and from that time Welsh poetry became artificial and mechanically correct, and eulogy and elegy took the place of love. Lewis Glyn Cothi wrote his historical odes from 1440–1480; he was followed by Tudur Aled, who died about 1530; and William Llŷn, who flourished about 1550. The last poet of this period may be said to be Edmwnd Prys, who in the later half of the 16th century composed a metric version of the Psalms, which is still used in the churches and chapels of Wales.

During the golden age of Welsh poetry no prose was written that deserves mention. A new period dawns with the publication of the New Testament in 1567. The translator, William Salesbury, had a craze for restoring every Latin word into its original form; so that his Testament was unintelligible to the mass of the people. But the whole Bible, translated into good, vigorous Welsh by Dr W. Morgan, was published in 1588. In those years many grammars and dictionaries were published; and in 1620 a new and much improved edition of the Bible was issued, and is, with few alterations, the Bible now in use. In 1630 Dr J. Davies published his Welsh-Latin dictionary, which remained the standard work for more than 150 years. During the 17th century one poet, Hugh Morris, is perhaps worthy of mention. The two most important prose writers were Morgan Llwyd o Wynedd, who wrote about the middle of the century eight books in defence of the Puritans; and Charles Edwards, who published in 1671 an excellent 'History of the Faith.' With these exceptions the Welsh literature of this century consisted chiefly of poor translations of English second-rate theological books.

But the 18th century witnessed a third revival of Welsh literature. Lewis Morris, born in 1702, became a proficient in most of the natural sciences then known, a skilled mathematician, and mineralogist. He devoted his leisure hours to the study of Welsh antiquities and literature. He instructed Goronwy Owen and other young bards in the rules of Welsh poetry, and by his direction and guidance brought about the last revival of Welsh literature. Goronwy Owen, the greatest bard of this period, was born of poor parents in 1722, was educated at the Bangor grammar-school and Jesus College, Oxford, and failed to get a curacy in Wales. Goronwy's poetry is the lament of an exile. His odes to his native Anglesey are perhaps the finest things written in Welsh.

About this time a religious movement, known afterwards as the Welsh Methodist revival, took place through the instrumentality of a few earnest clergymen. Griffith Jones of Llanddowror founded 3000 schools in all parts of the country to teach the people to read the Bible in the only language they could understand. The work of these schools has since been carried on by the Sunday-schools. Modern Welsh literature is the joint product of the literary and religious movements of the 18th century. The literary movement gave it purity of language; the religious movement gave it most of its subjects, and taught the people to read.

The bards of the 19th century are exceedingly numerous; the best are Robert ap Gwilym Ddu, Dewi Wyn, Caledfryn, Eben Fardd, Ieuan Glan Geirionnyd, Emrys, Nicander, Islwyn, and Ceiriog. The prose of this century is mostly theological; of purely literary works we may mention the historical works of the Rev. P. Price, of Gweirydd ap Rhys, and of Meudwy Môn, the essays of the brothers Roberts of Llanbrynmair, the works of Dr William Rees, the literary essays of Dr L. Edwards, and the novels of Mr Daniel Owen.

The early grammars and the dictionary of Dr Davies have been mentioned. In 1707 Edward Lhuyd of Jesus College published his *Archæologia Britannica*, which Dr Schrader calls 'an extremely

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remarkable work for its time.' It contains grammars and comparative dictionaries of the Celtic dialects; even sounds are compared and phonetic laws deduced; and it has been said of Lhuyd that he lived 150 years before his time. But the native philologists did not in the least understand him; and in 1803 W. Owen, afterwards Dr W. O. Pughe, published his dictionary, based philologically upon the theory that every Welsh word was an agglutination of monosyllabic roots invented by the Druids. Owen's method is still the popular one in Wales. Prichard (q.v.), in *The Eastern Origin of the Celtic Nations* (1831), first attempted to apply to the Celtic languages the canons of comparative philology; but Zeuss (q.v.), in his *Grammatica Celtica* (1853), was the first to succeed in this. After Zeuss many names might be mentioned; but perhaps Prof. Rhys (q.v.) has done more, in a direct way, for Welsh philology and grammar than any other scholar.

One of the best results of the last revival was the interest which it awoke in Welshmen in their old literature. In the first years of the 19th century the *Myvyrian Archaiology*, under the editorship of Owen Jones, William Owen, and Edward Williams, was published at Owen Jones's expense. It contained the works of the early bards and historical and other works of the middle ages. A second edition was issued by Mr Gee of Denbigh in 1870. In 1838 Lady Guest published the *Mabinogion*, with translations. Subsequently the Welsh MSS. Society was formed, and the *Liber Landavensis*, the *Lives of the Saints*, the *Iolo MSS.*, and other ancient documents were published by it. In 1868 Mr W. F. Skene published his *Four Ancient Books of Wales*, containing the Book of Aneurin, the Book of Taliesin, the Black Book of Carmarthen, and the poetry of the Red Book of Hergest (q.v.), with translations and notes. In 1887 the first volume was published of the *Welsh Texts*, under the editorship of Prof. Rhys and Mr Gwenogvryn Evans. It consists of a diplomatic reproduction of the Mabinogion from the Red Book of Hergest. A fac-simile of the Black Book of Carmarthen, and the Bruts from the Red Book have since been issued.

PRINCE OF WALES is the title borne by the eldest son of the sovereign of England. After the fall of the last native princes of Wales, Llewelyn in 1282 and David in 1283, Wales came fully under the dominion of Edward I., who in 1284 is fabled to have presented the Welsh with a prince in his infant son, Edward, really born at Carnarvon Castle. Edward, by the death of his elder brother four months later, became heir-apparent; but it was not till 1301 that he was created Prince of Wales. Edward III. in 1343 invested his son Edward the Black Prince with the principality, and from that time the title of Prince of Wales has been borne by the eldest son of the reigning king. Till the time of Charles II. the Welsh connection was oddly maintained by the arrangement that the Prince of Wales always had a Welsh wet-nurse. The title is not inherited, and has usually been bestowed by patent and investiture, though in a few instances the heir to the throne has become Prince of Wales simply by being so declared. The eldest son of the sovereign is by inheritance Duke of Cornwall, a title first conferred in 1337 on Edward the Black Prince. The title of Earl of Chester, borne by Edward III. before his accession to the throne, has since been given along with the principality of Wales. On the death of a Prince of Wales in his father's lifetime the title has been conferred on the sovereign's grandson, or next younger son, being heir-apparent, though not upon Charles I. till four years after the death of Prince Henry. As heir of the crown of Scotland the eldest son of the sovereign is Great Steward of Scotland, Duke of Rothesay, Earl of Carrick, Baron of Renfrew, and Lord of the Isles, pursuant to an act of the Scottish parliament in 1469. Albert-Edward, Prince of Wales, was created Earl of Dublin on September 10, 1849, that dignity being destined to him and his heirs for ever.

An annuity of £40,000 was settled on the Prince of Wales in 1863. He has besides the revenues of the duchy of Cornwall. These amounted prior to 1840 to between £11,000 and £16,000; since that period they have greatly risen, amounting in 1890 to £72,905 (of which £64,523 was paid to the prince, the rest being applied for the benefit of the estates, &c.). An income of £10,000 is settled on the Princess of Wales, to be raised to £30,000 in the event of her widowhood. The annuities of the Prince and Princess of Wales are charged on the Consolidated Fund. The Prince of Wales has a separate household, as also has the Princess of Wales. The statute of treasons, 25 Edw. III., makes it treason to compass the death of the Prince of Wales or violate the chastity of his consort. By a statute of the Order of the Garter, of date 1805, the Prince of Wales as soon as he receives that title becomes a Knight of the Garter. The arms of the Prince of Wales are those of the sovereign, differenced by a label of three points argent, and the present Prince of Wales bears *en surtout* the escutcheon of the House of Saxony. The supporters and crest are the same as those of royalty. For the crown, see CORONET. The Prince of Wales has further a distinguishing badge, composed of a plume of three white ostrich feathers, encircled by an ancient coronet of a Prince of Wales, and accompanied by the motto 'Ich Dien' ('I serve'). See BADGE, ICH DIEN, ALBERT-EDWARD, REGENT, SANDRINGHAM.

Walfish. See WALVISCH.

Walhalla (the German form of the Icelandic *Valhöll* or *Valhal*, 'the Hall of the Slain'—i.e. 'heroes'), the name of the place of residence for the fallen in battle in Scandinavian Mythology (q.v.).—The name WALHALLA was given to a magnificent marble structure of nearly the same proportions as the Parthenon (q.v.), erected by Ludwig I. of Bavaria (1830–41) as a temple of fame for all Germany, on an eminence 250 feet above the Danube, near Ratisbon. By means of statues, busts, reliefs, and tablets the mythology and history of Germany are illustrated, and her greatest names commemorated.

Walker, CLEMENT, was a native of Cliffe in Dorsetshire, sat for Wells in 1640, was imprisoned in the Tower by Cromwell in 1649 for writing his *History of Independency* (complete 1646–60), and died there in 1651. The work is rambling and bitter, but is worth attention.

Walker, FREDERICK, artist, was born in Marylebone, 24th May 1840, studied at the British Museum, the Royal Academy, and elsewhere, and became a wood-engraver. He also made drawings for the *Cornhill*, *Good Words*, *Once a Week*, and other periodicals, and contributed to the exhibitions of the Society of Painters in Water-colours. An A.R.A. since 1871, he died at St Fillans, Perthshire, 4th June 1875. Amongst the pictures to which he owes his recognised position as one of the foremost painters of the English school are the water-colours, 'The Wayfarers,' 'The Rainbow,' and 'The Fishmonger's Shop,' and the oil-paintings, 'The Bathers,' 'The Vagrants,' 'The Old Gate,' 'The Plough,' and 'The Harbour of Refuge.' See *Good Words* for July 1888.

Walker, GEORGE, the heroic defender of Londonderry, was born of English parents in County Tyrone in the early part of the 17th century, had his education at the university of

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Glasgow, took orders, and became rector of Donoughmore. When the Irish army of James II. approached Londonderry, the walls of which were untrustworthy, while the governor (Lundy) was a traitor, and the bishop (Hopkins) a timid advocate of passive obedience, the famous thirteen prentice-boys closed the city gates (18th December 1688), and the aged Walker by his fiery harangues stirred up the townspeople to make a desperate defence, the most memorable in British history. The actual siege began in April, and lasted till the 12th August 1689 (o.s.), a period of 105 days. The starving citizens were sustained to the last by the rousing sermons preached by Walker in the cathedral, and his heroic example at the head of sallies against the enemy. When the siege was raised Walker went to London, was warmly received at court, thanked by the House of Commons, created D.D. by Oxford, and Bishop of Derry by the king. But Walker was too impatient to settle quietly in his bishopric; he headed the men of Derry at the battle of the Boyne, and there perished. A lofty Doric column bearing a colossal statue of Walker stands on the walls at Londonderry.

Walker, JOHN, author of the *Sufferings of the Clergy*, was a native of Devonshire, and had his education at Exeter College, Oxford, where he became fellow, graduating M.A. in 1699. He became rector of St Mary-the-More, Exeter, and died there about 1730. His famous work is entitled *An Account of the Sufferings of the Clergy who were Sequestered in the Grand Rebellion* (folio, 1714). The work itself was called forth by Calamy's *Abridgment of the Life of Mr Baxter*, nearly half of which is the famous *Particular Account of the Ministers who were ejected by the Act of Uniformity*, and Calamy himself replied to it in *The Church and Dissenters compared as to Persecution* (1719). Withers, a dissenting minister of Exeter, also made a reply, and still more Neal in his *History of the Puritans*. Walker estimates at from seven to eight thousand the number of clergy 'imprisoned, banished, and sent a-starving.'

Walker, JOHN, dictionary-maker, was born at Colney Hatch in Middlesex, 18th March 1732, was by turns actor, schoolmaster, and peripatetic teacher of elocution, passed from Presbyterianism to the Roman Catholic communion, and died in London, 1st August 1807. His well-known *Rhyming Dictionary* first appeared in 1775, and has since relieved the poetic pains of countless poetasters, and even of Lord Byron. His *Critical Pronouncing Dictionary* was published in 1791, and had not lost its vogue, or the value of a traditional name, after nearly forty editions and sixty years.

Walker, JOHN, an Oxford antiquary, was born in 1770, became fellow of New College, Oxford, and was vicar of Hornechurch in Essex from 1819 till his death in 1831. His works were *Curia Oxoniensis; Oxoniana* (4 vols.); *Selection of Curious Articles from the Gentleman's Magazine* (3 vols. 1809); and *Letters Written by Eminent Persons* (2 vols. 1813).

Walker, THOMAS, was born at Manchester in 1784, son of a Liberal manufacturer, whom Erskine defended successfully on a charge of high-treason at Lancaster. He was educated privately, then went to Trinity College, Cambridge, where he graduated in 1808. He took to law, was called to the bar by the Society of the Inner Temple in 1812, became a Lambeth police-magistrate in 1829, and died at Brussels, 20th January 1836. He gave much thought to the problem of panperism, and published a book on the subject in 1826; but his chief reputation was as a conversationalist of rare humour. His famous weekly periodical, *The Original*, ran only for twenty-six numbers, from May to 11th November 1835. His characteristic quality is seen here in the touch of humour which adds interest to themes the most ordinary.

Walker, WILLIAM, filibuster, was born 8th May 1824, at Nashville, Tennessee, the son of an emigrant Dundee banker. He graduated at the university there in 1838, studied medicine at Edinburgh and Heidelberg, but soon gave this up for law and afterwards journalism at New Orleans and in California. In 1853 he failed in an attempt to conquer Sonora and to found a new republic there and in Lower California; with forty-four companions he did capture La Paz, but the native Mexicans refused to be 'liberated,' and on 8th May 1854—his thirtieth birthday—'President' Walker fought his way across the frontier into California and surrendered with the gaunt, starved, wounded survivors of his expedition to the United States commander. A trial for breaking the neutrality laws ended in his acquittal, and a year later he was on his way to Nicaragua, with fifty-five followers, invited to help the Democrats against the Legitimist party. The strange story of Walker's adventures in Central America cannot be more than outlined here. In June 1855 he was repulsed at Rivas with a loss of twenty; but in September, at the head of 110 men, he took the capital, Granada, with the loss of only a drummer. A new government was constituted, with Walker as generalissimo, and in four months he raised an American force of 1400 men, whom he kept under an iron discipline. In February 1856 Costa Rica declared war for the express purpose of driving out the foreigners; but battle and cholera thinned the ranks of the invaders, and of 3000 men only 500 escaped to carry the pestilence back with them across the border. In June Walker was elected president of Nicaragua, and his government was recognised by the United States. Walker's support came chiefly from the southern states, and his aim was to extend the area of slavery southward; accordingly almost the first act of the new administration was to restore slavery, which had been abolished in 1824. Meanwhile his enemies had gathered a force of allies from the surrounding republics, and, though he destroyed nearly 800 of them, he was compelled before the end of the year to burn and abandon Granada. Gradually the allies closed in upon him at Rivas, and on May 1, 1857, he was forced to capitulate to a United States sloop-of-war sent out for the purpose. But in November he landed again at S. Juan del Norte, with a force of 150 men—only to be compelled to surrender, in December, to a United States frigate and carried prisoner to New York, where, as his arrest on foreign soil was illegal, he was soon liberated. In 1860 he published *The War in Nicaragua*, and turned Catholic. In August he sailed from Mobile for Honduras, with a force of 100 men. He took Trujillo in half an hour, but had to evacuate it on the order of a British man-of-war, by whose commander he was given up to the Honduras authorities. By them he was tried by court-martial, and shot at Trujillo on 12th September 1860. Personally pure, temperate, honest, and fearlessly brave, Walker appears to have been led away by an unquestioning belief in his 'destiny.' See C. W. Doubleday's *Reminiscences* (1886), and J. F. Roche's *Story of the Filibusters* ('Adventure' series, 1891).

Walker, WILLIAM SIDNEY, Shakespearian scholar, was born at Pembroke in 1795, had his education at Eton and Trinity College, Cambridge, became fellow thereof, and died, after a life far from fortunate, in 1846. His name survives through the remarkable value of his *Shakespeare's Versification* (1852), and *Critical Examination of*

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the Text of Shakespeare (3 vols. 1859), both edited anonymously by W. N. Lettsom. His *Poetical Remains* appeared in 1852, with a memoir by the Rev. J. Moultrie the poet.

Walking. See ATHLETICS.

Walking-leaf. See LEAF-INSECT.

Walking-stick, the popular name of many Orthopterous insects of the family Phasmidæ, which strikingly resemble the twigs of plants. The body is long and slender, the legs are also twig-like, the wings are sometimes absent, sometimes rudimentary, sometimes leaf-like. Sluggish in their habits, herbivorous in diet, the walking-sticks are very effectively concealed by their resemblance to the plants on which they rest and feed. Rossi's Stick-insect (*Bacillus rossii*) in southern Europe, the American *Diapheromera femorata*, whose colour changes with that of the foliage, and large species of Phasma, sometimes measuring 10 inches in length, may be cited as representative. The Leaf-insects (Phyllium) are nearly related. See MIMICRY.

Walking-stick (*Diapheromera femorata*).

Walking-sticks have been in use from the remotest antiquity, not merely for helping to support the weight of the person, but for the appearance of dignity and elegance they lend. Developments from the walking-stick are the Pastoral Staff (q.v., and see FILLAN, ST), the sceptre, the constable's baton or staff, and the rod or wand of office generally (but cf. MACE). The pilgrim's staff in the middle ages was a stout stick four feet long and made hollow at the top, presumably for containing relics; but the hollow was sometimes convenient for conveying secretly valuable plants, seeds, or eggs (such as saffron and silkworm eggs), of which Chinese, Turks, and Greeks forbade the export. At a later date the tall sticks of doctors had a smaller receptacle to contain snuff or other supposed disinfectants. Magnificent and costly sticks were part of the equipment of fops in the 18th century. For the making of walking-sticks almost every kind of wood is used. Thus in England oak, ash, crab, hazel, sloe or blackthorn, broom, and juniper are favourite woods. Small stems or canes of some palms—as Malacca canes and Penang lawyers—are imported into London in large numbers; the midribs of some palm-leaves are serviceable, as are shoots of bamboo, of orange, myrtle, cinnamon, and sweet-cherry. The heads—flat, round, crooked—may be of the same piece of wood, or may be fixed on, carved or plain, made of deer's or other horn, or of ivory, silver, &c.

Walkyries (more correctly *Valkyrjur*), in Northern Mythology, either nine or three times nine divine maidens who cleave their way through air and water to lead to Odin those who have fallen in battle and who are worthy of Valhalla.

Wall. See the relevant section under BUILDING, and other articles there referred to; BUTTRESS; the articles on the various styles of architecture; and for military building, FORTIFICATION. For ancient lines of defence, see ANTONINUS (WALL OF), HADRIAN'S WALL, CATRAIL, and OFFA'S DYKE. Of old walled towns, retaining more or less completely their ancient walls of fortification, may be named in the British Isles Berwick, Alnwick, York, Chester, Conway, Tenby, Dover, Wareham, Limerick, and Derry.

Wallaby. See KANGAROO.

Wallace, ALFRED RUSSEL, traveller and naturalist, was born at Usk in Monmouthshire, 8th January 1822, and was educated for the profession of land-surveyer and architect, a calling he exercised until 1845, when he devoted himself exclusively to studies and researches in natural history. He spent four years on the Amazon with Mr Bates, and eight amongst the Malay Islands, making extensive zoological collections. It was while living in the East that, unaware of Mr Darwin's cognate researches and speculations, Wallace formed and committed to writing a theory of development by natural selection, though not using the term. Valuable contributions to zoology, botany, and cognate subjects are to be found in his *Travels on the Amazon and Rio Negro* (1853); *Palm Trees of the Amazon* (1853); *The Malay Archipelago* (1869; 10th ed. 1892); *Contributions to the Theory of Natural Selection* (1870). In a work *On Miracles and Modern Spiritualism* (1875) he vindicates views seldom entertained by men of science; the article SPIRITUALISM in the present work is from his pen. *The Geographical Distribution of Animals* (1876) practically founded a new science; for 'Wallace's Line,' see the article GEOGRAPHICAL DISTRIBUTION. *Tropical Nature* appeared in 1878, *Australasia* in 1879, *Island Life* in 1880, *Land Nationalisation* in 1882, *Bad Times* in 1885, and *Darwinism* in 1889. He has also been president of a land nationalisation society, and has issued a scheme for the nationalisation of the Church of England. He has opposed compulsory vaccination in his *Forty-five Years of Registration Statistics* (1885). A civil list pension of £200 a year was bestowed upon him in 1881 in recognition of his scientific work, and in 1882 the degree of LL.D. was conferred upon him by Dublin University.

Wallace, SIR WILLIAM, the Scottish patriot, was born about 1274, the second of the three sons of Sir Malcolm Wallace of Elderslie, near Paisley, by Margaret, daughter of Sir Reginald Crawford, sheriff of Ayr. The name Wallace—otherwise Valeys, Walensis, le Waleys, &c.—means simply 'Welshman;' and the Wallaces may have come north with the Stewarts (q.v.), of whom they seem to have been feudal dependents. Blind Harry associates the hero's boyhood with Dundee, his youthful manhood with Ayrshire; whilst, according to Fordun, he got part of his education from an uncle, the priest of Dunipace, who instilled into him the maxim, 'Libertas optima rerum.' But his true history, even in the next generation, was so obscure that it now is next to impossible to separate truth from falsehood or exaggeration. He first stands out clearly in the spring of 1297 as the chief of a patriotic force, arrayed against Edward I. (q.v.) of England. To avenge, says Wyntoun, the murder of his young wife, he attacked the English garrison at Lanark and slew William de Hazelrig: he attempted to surprise the English justiciar at Scone; and with a large company he lay in the Forest of Selkirk. This last fact (the first that is absolutely certain) appears from a letter written by Cressingham to Edward on 23d July, a fortnight before which

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date the Scottish nobles, with the exception of Sir Andrew Moray, had submitted at Irvine to Edward. Edward himself was at the time in Flanders, but his general in Scotland was Warenne Earl of Surrey; and him on 11th September Wallace utterly defeated in the battle of Stirling Bridge, as he was trying to pass beyond the Forth. The whole kingdom submitted to Wallace, whom we find the next month making friendly overtures to the Hanse towns of Lübeck and Hamburg, and who, crossing the Border, harried all the north of England as far south as Newcastle. (Blind Harry absurdly takes him as far as St Albans, and makes him have a meeting with the English queen, when English queen there was none.) On his return from this expedition he was appointed 'Governor of Scotland, in name of King John [Baliol], and by consent of the Scottish nation.' In 1298 Edward in person invaded Scotland at the head of 88,000 men. Wallace adopted a Fabian policy, but was forced to give battle at Falkirk (22d July), where, deserted by the cavalry, his 'schiltrouns' or circular formations of infantry were shot down by the English archers and totally routed. The Scottish loss is variously estimated by the English chroniclers at from 22,000 to 100,000, but according to Scottish writers the whole army did not exceed the former number. With this defeat Wallace's brief but glorious career terminated. We know that he visited France, whose king, Philip, came near surrendering him to Edward; we know also that he at least contemplated a visit to Rome; and then, on 3d August 1305, seven years after the battle of Falkirk, we have his capture near Glasgow by Sir John Menteith, Edward's Scottish governor of Dumbarton. He was brought to London, and, crowned with laurel in mockery, was tried for treason in the great hall of Westminster. He pleaded, and truly, that he had never been King Edward's vassal or subject; but he was condemned and executed that very same day at West Smithfield—hanged, disembowelled, beheaded, and quartered, the quarters being sent to Newcastle, Berwick, Stirling, and Perth.

See the article HARRY (BLIND) for an account of the epic which moulded, whilst embodying, the popular conception of Wallace; and for authentic materials refer in the first place to the Rev. Joseph Stevenson's *Documents illustrative of Sir William Wallace* (Maitland Club, 1841), which may be supplemented by vol. ii. of Hill Burton's *History of Scotland*; the Marquis of Bute's *Early Days of Sir William Wallace* (Paisley, 1876), his *Burning of the Barns of Ayr* (*ib.* 1878); A. Brunton's *Sir William Wallace* (Glasgow, 1881); Henry Gough's *Scotland in 1298* (Paisley, 1888); James Moir's *Sir William Wallace* (Aberdeen, 1888); and the Rev. C. Rogers' *The Book of Wallace* (2 vols. Grampian Club, 1889)—this last, however, must be used with caution.

Wallace, WILLIAM VINCENT, musician and operatic composer, was born at Waterford, of Scotch parents, June 1, 1814. He early attained proficiency as a performer on the pianoforte and violin—his performances on the latter instrument bringing him under the notice of Paganini. After being for some years leader of an orchestra in Dublin, he emigrated for health's sake to Australia in 1832. By-and-by he appeared in Sydney as a musician, and gave concerts in Australia, New Zealand, India, and America. In 1845 he came to England and wrote his first opera, *Maritana*, which was an immediate success both in London and Vienna, and still holds the stage as one of the most popular of English operas. *Matilda of Hungary* followed it in 1847. During a sojourn of some years in Germany Wallace added further to his musical culture; and after again visiting America he composed *Lurline*, which was brought out in London in 1860, with even greater success than *Maritana*. In 1861 he produced *The Amber Witch*; in 1862, *Love's Triumph*; and in 1863, *The Desert Flower*. He died October 12, 1865, leaving another opera, *Estrella*, nearly completed. Wallace was a highly cultivated musician; the fresh motives and the brilliant orchestration of his operas stamped their author as one of the chief English composers of the century.

Wallachia. See ROUMANIA.

Walla Walla, capital of a county of that name in Washington, on the Walla Walla River, 204 miles by rail SSW. of Spokane Falls. Pop. (1880) 3588; (1890) 7239.

Wallenstein, or more correctly WALDSTEIN, ALBRECHT WENZEL EUSEBIUS VON, Duke of Friedland, Sagan, and Mecklenburg, the most remarkable of the imperial generals in the Thirty Years' War, was born at Hermanic in Bohemia on 14th September 1583. His parents were of Czech blood, of noble rank, and Protestants, and took their name from the castle of Waldstein near Turnau. After their death the education of the boy, then fourteen, was entrusted by a Catholic uncle to the Jesuits at Olmütz. Thence he passed to the university of Altdorf; and whilst making the grand tour he spent some time studying at Padua and Bologna. Having tried his sword in battle against the Turks, he took the first step on the ladder of ambition by marrying a Bohemian widow of vast expectations. At her death (1614) he added her estates to those he had inherited from his uncle. This enabled him to raise troops to assist the Archduke Ferdinand against Venice; and he still further ingratiated himself with his future emperor through his marriage with a daughter of Count Harrach, Ferdinand's favourite. When in 1618 the Bohemians took up arms against the emperor, Count von Waldstein (to which dignity he had meanwhile been advanced) raised troops at his own cost, and led them against his countrymen. The Bohemians humiliated, Waldstein contrived to possess himself, by means the reverse of honourable, of huge slices of their confiscated estates, and in 1623 gratified another of his ambitions by inducing Ferdinand to make him ruler of the new principality of Friedland in Mecklenburg. Two years later, the emperor being hard pressed by the Protestant princes, and having no army save the troops of the Catholic League, which he could not direct as he chose, Wallenstein offered to raise and equip for his imperial master's service 20,000 men at his own expense on condition that he was given a free hand in the hostile provinces. Ferdinand jumped at the offer, and on 25th July 1625 named the wealthy Bohemian magnate general-in-chief of all the imperial armies and conferred upon him absolute authority in the field. Wallenstein at once marched for the Elbe, and in the following spring defeated the emperor's bitter foe, Count von Mansfeld, at Dessau; in the autumn he chased him through Silesia and Hungary, and held him and his ally, Bethlen Gabor of Transylvania, in check, until Mansfeld's death and a truce with Bethlen freed Ferdinand from both these enemies. In the following year (1627) Wallenstein, co-operating with Tilly, won the Jutland peninsula and the Mecklenburg duchies from the Danes and the Protestant princes. At this time and during the next few months the emperor not only sold Wallenstein the dukedom of Sagan (in Silesia), but created Friedland a hereditary duchy, invested him with the duchy of Mecklenburg, and appointed him general of the Baltic and the North Sea.

Two objects which hovered before Wallenstein's mind at this period indicate the grandiose and wide-reaching character of his ideas: (1) the emperor should be made a despotic sovereign and head of a

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resuscitated empire of Byzantium, his power resting on strong and well-disciplined armies levied entirely in his own interest; (2) the power of the maritime Protestant nations of the north—Sweden, the Netherlands, England—should be broken, and the imperial sway be supreme at sea as well as on land. The latter of these ambitious dreams, which he attempted to realise by subduing Pomerania, was thwarted by the Swedish fleet and the heroic resistance of Stralsund, which, defying all Wallenstein's desperate efforts, had the honour of being the first to withstand successfully the man who believed that the stars were guiding his destiny to the loftiest heights of earthly glory. To his insatiable and unscrupulous ambition, and his greed of power, Wallenstein added an arrogance of manner, an overweening self-assurance, an arbitrary and wilful tone of behaviour, that gave the bitterest offence to Ferdinand's allies, the old princes of the empire. They, when Gustavus Adolphus invaded northern Germany, and the emperor was compelled to seek their aid against him, seized upon the opportunity to insist upon the dismissal of the 'upstart' Friedland. Contrary to Ferdinand's fears, Wallenstein quietly resigned (1630) his command and retired to Gitschin, the capital of his principality. But the inability of the Duke of Bavaria and his colleagues to check the progress of the invincible 'Snow-king' and his sheepskin-clad legions soon convinced the emperor that nothing could save him except the military genius of the man whom he had affronted. The Swedes, the Saxons, the Brandenburgers were closing in upon him; his allies were powerless to stand against them; and in the end of 1631 Ferdinand restored Wallenstein to the supreme command. But the proud and haughty duke only consented to resume action on his own terms, which practically made him absolute disposer of the military resources of the empire and supreme arbiter of peace and war. Having driven the Saxons out of Bohemia, he marched against the Swedes in Bavaria; he repulsed the desperate attempt of Gustavus Adolphus to storm his entrenched camp near Nuremberg (3d September 1632), but failed to get the better of the Swedish king at Lützen (q.v.), though his loss of the victory was more than outbalanced by the death of the mainstay of the Protestant cause.

Wallenstein's relations to the emperor, and his policy and aims, during this second investment with the supreme command were entirely different from those which had characterised his first tenure of the office. When Gustavus fell he knew perfectly well that his influence was paramount to decide the destinies not only of Ferdinand, but of the princes of the empire; he seems, therefore, to have resolved upon dictating peace to all the combatants alike, in the hope both of preserving his position as a prince of the empire and of founding a ruling (ducal or royal) dynasty. But circumstances and his own character were too strong for him. His innate love of intrigue, the ineradicable suspicion and irresolution of his nature, his impatience, his scornful pride, his instinctive predilection for mystery and crooked dealing, combined with the sudden fluctuations of circumstance, entangled him in such a complicated web of intrigue that the snarer was taken in his own toils. He sought to sow disunion amongst the Protestant princes as well as amongst the chiefs of the Catholic League; he negotiated at one and the same time with Arnim, the Saxon general, with the Swedes, with the French, with the Bohemian exiles, and hoodwinked them all and the emperor to boot; he coquetted with such bribes as the duchy of Franconia, the royal crown of Bohemia; he pretended a sincere desire to restore peace to distracted Germany; but over and above all these objects, real and professed, he aimed at keeping always a secure retreat open for himself, whatever might be the outcome of events. At length his enemies at court, pointing to his culpable inactivity after Lützen, and his open and secret negotiations with Swedes and Saxons, convinced Ferdinand that the all too powerful general was meditating treachery; and indeed in a conference with Arnim, near Schweidnitz on 16th August 1633, Wallenstein had proposed to join the Saxons and Swedes in assailing the empire, though owing to the mistrust of Arnim and of Oxenstjerna nothing came of the proposal. A month after Christmas the emperor, who had secretly won over certain of Wallenstein's officers, deposed the duke from his command and named General Gallas his successor, and in less than another month proclaimed Wallenstein a traitor, and released his officers from their oath of obedience to him. Wallenstein, thinking to find support in Bernhard of Saxe-Weimar (then on the Upper Danube), hastened to Eger in the mountains of western Bohemia. But some amongst his train were traitors, notably the Irishmen Butler and Devereux, and the Scotchmen Gordon and Lesley. These men, after killing his most faithful adherents, slew Wallenstein himself as he was retiring to rest on the evening of 25th February 1634.

Tall, spare but muscular, with a yellow skin, a thin beard, and glittering eyes that made men tremble, Wallenstein was stern of countenance and cold in demeanour, of untiring activity and a lover of order, moderation, and thrift. Such were the contradictions of his strangely complex character that he was both avaricious of wealth and lavish in expenditure, obstinate yet irresolute, in general sparing of words, though on occasion rash and bold of speech, yet always cautious to a degree against committing himself in writing, unusually tolerant of religious opinions, yet a firm believer in the quackeries of astrology, impatient of control, jealous of his authority, proud and domineering, yet a far-reaching and sagacious statesman, a man consumed by the most insatiable ambition, but capable at the same time of dreaming the grandest and remotest of ideals. As a recruiter and organiser of armies, a general who could not only maintain the strictest discipline, but make himself beloved of his soldiers, and lead them to certain victory, he stands almost unrivalled. Too great for a subject, he was not great enough, or at least, consistently bold enough, to usurp the throne of a ruler; his ambition and untiring energy came to naught because he lacked resolution to fit them together for controlling the circumstances over which destiny made him master.

See Lives by Ranke (4th ed. 1880), Förster (1834), Aretin (1846), Hurter (1855), and others; monographs by Irmer (1888–89), Gädeke (1885), and Hildebrand (1885); Förster's edition of Wallenstein's Letters (3 vols. 1828–29); and Schiller's trilogy of plays; besides other works cited at THIRTY YEARS' WAR and in Schmid's *Die Wallenstein-Litteratur* (1878).

Waller, EDMUND, poet, was born of an ancient and wealthy family at Coleshill near Amersham in a detached portion of Hertfordshire, 3d March 1605. A maternal uncle was the father of John Hampden, and married Elizabeth Cromwell, aunt of the great Oliver, but a devoted royalist throughout. Waller had his education at Eton and King's College, Cambridge, and is usually said to have been returned member for the borough of Agmondesham (Amersham) in the short-lived parliament of 1621–22. A likelier date is 1623; certainly he was returned for Chipping-Wycombe in 1625, for Agmondesham in 1627. At six-and-twenty he cut out Ann Banks, a wealthy London heiress, from the fortune-hunters about court, but

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she soon afterwards died, leaving him free to sing the praises of his famous Saccharissa—the beautiful Lady Dorothy Sidney, eldest daughter of the Earl of Leicester. His suit was spurned, and not more successful was his wooing of Amoret, supposed to be the Lady Sophia Murray. Long afterwards, in her old age, Saccharissa, meeting the poet one day, asked him when he would again write verses upon her: 'When you are as young, madam, and as handsome as you were then,' he replied. Waller was again returned for Amersham to the famous Long Parliament, and he seems in the great constitutional struggle to have tried the difficult task of sitting on both sides. He spoke well, and was chosen by the house to conduct the impeachment of Crawley for his judgment in the ship-money case. But his heart was with the king, and it is probable that he was gained over even before his visit as one of the commissioners to Charles at Oxford in 1643. He now plunged into a dubious plot on the king's behalf, and as soon as it was discovered was arrested and expelled the House. He showed himself an abject coward, eager to confess not only all he knew but all he suspected, and his sentence of death was commuted into a fine of £10,000 and banishment for life. He lived at Rouen, in Switzerland, and in Paris, travelled six months in company with Evelyn, and was as popular among the impoverished exiles for his hospitality as his wit. He was permitted to return in 1653. Cromwell appears to have liked to talk with him, and certainly Waller's famous panegyric is his sincerest and almost his best poem. In 1661 he sat for Hastings, and in later parliaments for Chipping-Wycombe and Saltash in Cornwall. He was ready with his congratulation, 'Upon His Majesty's Happy Return,' and, when the king complained that it was inferior to the panegyric on the Protector, replied with matchless readiness and wit, 'Poets, sir, succeed better in fiction than in truth.' Waller continued to the end a favourite at court, where his water-drinking was forgiven for his wit. He was anxious to become Provost of Eton, but as laymen were excluded by statute was hindered by Clarendon. He tried to revenge himself upon the minister in the moment of his fall, but had his reward in the elaborate character limned by the historian, in which his cowardice and meanness are gibbeted to all posterity. He died at his house at Beaconsfield, 21st October 1687, and was buried there. He left by his second wife a large family of sons and daughters.

Waller's poems, which are mostly of the *occasional* character, were widely circulated, but not published till 1645—again in 1664. His feeble character, out of place in that resolute age, is reflected in his poetry, which is easy, flowing, felicitous, but lacking in sincerity and strength. Pope has eulogised his *sweetness*, which word we may allow if we limit its meaning to elegance, ease, and grace, without passion, energy, or creative force. His importance in English poetry is that he revived the heroic couplet, and used it easily in that form which it retained for over a hundred years. Denham felt his influence most strongly, and forms the link between him and the great Dryden.

Editions of Waller are those of Fenton (1729), and Mr G. Thorn Drury in 'Muses Library' (1893). See Mr Gosse's Cambridge lectures, *From Shakespeare to Pope* (1885); but the extravagant importance given to the influence of Waller is a paradox not to be admitted. See also Julia Cartwright's *Sacharissa* (1892).

Wallflower (*Cheiranthus*), a genus of plants of the natural order Cruciferæ, having the siliques quadrangular from the prominence of the nerves on the back of the valves, the seeds in a single row in each cell, the stigma deeply two-lobed, the lobes bent back. The flowers are in racemes. The species are annual, biennial, or perennial herbaceous plants, some of them almost shrubs. The Common Wallflower (*C. cheiri*) is found in rocky places and on old walls in the south of Europe, and also, but less abundantly, in the middle of Europe and in Britain. In its wild state its flowers are always yellow; but in cultivation they exhibit a considerable diversity of colours, chiefly brown, purple, and variegated, and they attain a larger size. It is a universal favourite on account of the delicious odour of its flowers. The varieties in cultivation are very numerous, but there are among them no marked distinctions. Double and semi-double flowers are not uncommon. The plant is perennial, but in gardens is generally treated as a biennial, although fine kinds are propagated by cuttings, which soon strike root under a hand-glass. The ordinary mode of cultivation is to sow the seed of an approved kind, and to plant out the seedlings. The flowers have a bitter and cress-like taste, and were formerly used as a medicine.

Wall-fruit. See GARDENING, FRUIT, PEACH, APRICOT, &c.

Wallingford, a town of Berkshire, 15 miles NW. of Reading and 13 SSE. of Oxford, on the right bank of the Thames, which is crossed here by a bridge 300 yards long, built in 1809 at a cost of £14,000. It has Roman earthworks, a fragment of a Norman castle, which figured prominently in King Stephen's wars, and was taken by Fairfax, and dismantled (1646); three—formerly thirteen—churches, in one of which Blackstone is buried; a grammar-school; a short branch-line; and a great July wool sale. A borough since Edward the Confessor's time, it returned two members till 1832, and then one till 1885. Pop. 2989.

See Crofts' *Chronicles of Wallingford Castle* (1870), and J. H. Hedges' *History of Wallingford* (2 vols. 1882).

Wallingford, a borough of Connecticut, on the Quinepiac River, 13 miles by rail NNE. of New Haven, with manufactories of buttons and Britannia and silver ware. Pop. 6538.

Wallis, JOHN, mathematician, was born at Ashford, Kent, 23d November 1616, was trained at Cambridge, and took orders, but in 1648 became Savilian professor of Geometry at Oxford. He sided with the parliament, was secretary to the Westminster Assembly, but strenuously favoured the Restoration. His principal work is his *Arithmetica Infinitorum*, but he wrote on proportion, mechanics, the quadrature of the circle (against Hobbes), grammar, logic, theology, and the teaching of the deaf and dumb, and edited some of the Greek mathematicians. He was one of the founders of the Royal Society. He died 28th October 1703. A collected edition of his works appeared in 1791.

Walloons (Fr. *Wallon*), the name given to a population of mixed Celtic and Romanic stock akin to the French, occupying the tract along the frontiers of the Teutonic-speaking territory in the South Netherlands, from Dunkirk to Malmedy. They are located more particularly in the Ardennes, in parts of Pas-de-Calais, Nord, Aisne, and Ardennes in France, but chiefly in South Brabant, Hainault, Namur, Liége, and Luxemburg, and in the neighbourhood of Malmedy in Rhenish Prussia. The Walloons, whose numbers in Belgium are stated at 2¼ millions, are the descendants of the old Gallic Belgæ, who held their ground among the Ardennes Mountains when the rest of Gaul was overrun by the German conquerors, but became eventually Romanised, especially in their language, which is now a patois or popular dialect of northern French, with a considerable infusion both of old Celtic and Low German elements. The name Walloon (in Dutch *Walen*) is akin to Galli, Gaels, Welsh,

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Welsch, Wallachians, &c. The Walloons of the present day resemble their French more than they do their Flemish neighbours. They are middle-sized, with dark hair, and are adroit, active, impulsive, and in every way more like the French than the Flemings. They make good soldiers, and were famous as ruthless mercenaries in the Thirty Years' War (Tilly was a Walloon); and it is worthy of notice that the Belgian revolution was pre-eminently the work of the Walloon districts. It was against the Walloon spirit and tendencies that the Flemish movement (see HOLLAND) was chiefly directed. During the persecutions by the Inquisition in the Low Countries bodies of Walloons fled to England, and many of the French-speaking Protestant congregations (often called 'Walloon congregations') were wholly or partly composed of Walloons (as at Canterbury, Norwich, and elsewhere).

See works on the people and dialect by Grandgagnage and Scheler (1845–80), Dejardin (1863), Forix (1866–74), Simonon (1845), and Van der Kindere (1872).

Wall-paper. For ordinary purposes this consists of a tough, but not a thick paper, printed with a pattern in size colours. For expensive wall-papers a rather stout paper is used, and for very cheap kinds a paper of such poor quality that it can only be pasted on walls without tearing by great care. The printing of the commoner kinds is done with a roller printing-machine something like that used in Calico-printing (q.v.), but the better class of wall-papers are block-printed by hand. The printing rollers or blocks are either entirely of wood, in which case the pattern is cut on their surface, or they are of wood faced with a pattern formed of felt, and outlined with thin brass fixed edgewise into the wood. Flock-paper, sometimes called velvet-paper, is made by printing the pattern in strong size, and then dusting this over with ground wool dyed various colours, and called 'flock.' The superfluous flock which does not adhere to the size is then shaken off. Flock-papers so made have a rich effect, but for some time past most of them have been prepared in one colour, and painted over after being put on the walls. In the latter case they in some degree imitate embossed leather. Such parts of a pattern as are to be finished in bronze or gold leaf are first printed in gold size. Embossed Japanese wall-papers entirely coated with bronze, but with the sunk portion of the pattern printed in colour over the bronze, are now much used in Great Britain. These are varnished, and therefore admit of being washed. The Japanese use powdered mica or talc to give paper a silvery appearance.

The modern system of paper-hanging, which is so far an imitation of the older manner of decorating walls with figured textile fabrics or embossed leather, came into use in Europe after the paper-making machine was brought into practical shape in the beginning of the 19th century. Before that paper could only be obtained in sheets of limited size, which were, however, to some extent used for covering walls after a pattern had been put on them. The Chinese appear to have used wall-papers for centuries.

In the later decades of the 19th century the patterns on wall-papers have, as a rule, been greatly improved, some of the best decorative artists in England and France having been frequently employed in designing them. It is hardly necessary to say that no plastered wall should be papered, except with plain cartridge paper, until it is thoroughly dry. See EMBOSSING.

Wallsend, a town of Northumberland noted for its collieries, 4 miles NE. of Newcastle. It is named from its being at the end of the Roman wall (see HADRIAN'S WALL); and many Roman relics have been found here. Pop. (1881) 6351; (1891) 11,620.

Wall Trees. See GARDENING, ESPALIER, FRUIT.

Walmer Castle, in Kent, 2 miles S. of Deal, is the official residence of the Lord Warden of the Cinque Ports (q.v.), and is a round-towered castle, built by Henry VIII. It was the favourite residence and the death-place of the Duke of Wellington; and its relics of him, of Pitt, and of other Lord Wardens were in 1892 secured to the nation by the son of the late Right Hon. W. H. Smith. The adjoining town of Walmer is a favourite watering-place, has barracks, and is a member of the Cinque Port of Sandwich. Pop. (1891) 4565. See Rev. C. Elvin's *Records of Walmer* (1891).

Walnut (*Juglans*), a genus comprising seven or eight species of beautiful trees of the natural order Juglandaceæ. All are trees with alternate pinnated leaves, monœcious flowers, and a drupe-like fruit, with a deciduous fleshy husk, which bursts irregularly, and a deeply wrinkled shell (*putamen*) of two valves, within which is the seed, curiously lobed and wrinkled, with a membranaceous *testa* and partial dissepiments. The Common Walnut (*J. regia*) is a native of Persia and the Himalayas, but has long been cultivated in all parts of the south of Europe. The date of its introduction is unknown, but it was certainly cultivated by the Romans in the reign of Tiberius. It is a lofty tree of 60 to 90 feet, with large spreading branches. The leaves have two to four pairs of leaflets, and a terminal one. They have a fine balsamic odour when bruised; this quality, however, being much more marked in some trees than in others. An infusion of them has been found useful in scrofula; when bruised and rubbed on the skin they are efficacious in curing itch; and placed in wardrobes they prevent the ravages of moths. The sap is limpid like water, but contains much sugar, so that the tree is sometimes tapped for it, like the sugar-maple, and the sugar is procured by evaporation; a pleasant kind of wine is also made from it. An excellent pickle and a kind of ketchup are made of the unripe fruit. The ripe fruit is one of the best of nuts, and is an important article of export from many parts of the south of Europe. Walnuts are also exported in large quantities from Cashmere and other Himalayan regions to supply the markets of India. In the south of Europe walnuts are a very considerable article of food, and when perfectly fresh they are wholesome and nutritious, although in the state in which they are imported into Britain they are not easily digestible. Just before they are ripe they are much used in France with vinegar, salt, pepper, and shallots. Among the varieties of walnut in cultivation is one with a very thin shell, which is much esteemed. Walnuts yield by

Walnut (*Juglans regia*).
a, nut; *b*, seed.

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expression a bland fixed oil, which, under the names of *Walnut Oil* and *Nut Oil*, is much used by painters as a drying oil, and in the countries in which it is produced is a common article of food. The *cake* left after the expression of the oil is sometimes used as an article of food, and is also used for feeding cattle and poultry. The timber of the walnut is of great value, and is much used by cabinet-makers. It is light, although hard and fine-grained; and gun-stocks are made of it. The wood of young trees is white, and little esteemed; that of old trees is brown, veined and shaded with darker brown and black. Aged trees of fine quality have been sold for £600 each. The wood of the roots is beautifully veined. Both the root and the husks of the walnut yield a dye, which is used for staining light-coloured woods brown. The walnut, when meant to become a timber-tree, is best sown where it is to remain, as the roots are much injured by transplanting. The best kinds of walnut for fruit are generally grafted. The walnut succeeds well in Britain as an ornamental tree, even in the north of Scotland, although it seldom quite ripens its fruit except in the warmest parts of England. The names in Teutonic lands (A.S. *wealh-hnutu*; cf. Ger. *walnuss*) indicate that it came into north Europe from Italy and France. Very similar to the common walnut is the Black Walnut (*J. nigra*) of North America, found in most parts of the United States, except the most northern. It is a very large and beautiful tree, the trunk sometimes 6 or 7 feet in diameter; its leaves have more numerous leaflets than those of the common walnut. The timber is even more valuable than that of the common walnut; the fruit is very inferior. The Butternut (*J. cinerea*) is abundant in the northern and north-western states of North America, and in Canada. It is a tree only about 50 feet high, with trunk about a foot in diameter; leaves with fifteen to seventeen leaflets; the fruit elongated, and externally covered with a viscid substance. The nut is hard and rough, with prominent ridges, and of good quality. The wood is not apt to split or warp, and is useful for many purposes. Sugar is obtained from the sap, as from that of the maple, but is of inferior quality. The inner bark is a mild cathartic, resembling rhubarb in its properties. The leaves, reduced to powder, are used for blistering, like cantharides.

Walpole, HORACE, fourth Earl of Orford, author and virtuoso, was born 24th September 1717 (O.S.) in Arlington Street, London. He was the third son of Sir Robert Walpole, afterwards first Lord Orford, by his wife Catharine Shorter. In April 1727 he went to Eton, where he had for schoolfellows the future poets Thomas Gray and Richard West. In 1735 he passed to King's College, Cambridge, Gray being already established there as a fellow-commoner of Peterhouse. In 1737 his mother died, and while he was still at the university he was appointed by his provident father to one or two patent places. Quitting college in 1739, he shortly afterwards, with Gray for companion, started on the orthodox grand tour. They visited France and Italy, making a prolonged stay at Florence. At Reggio a growing incompatibility of tastes ripened into a quarrel (of which Walpole in later years accepted the blame), and the companions separated. Then Walpole fell seriously ill at Reggio, and had it not been for the prompt intervention of Joseph Spence, professor of Poetry at Oxford, might have died. He however recovered, and returned to England to take his seat for Callington in Cornwall, to which, in his absence, he had been elected. At this time (1741) his father was tottering to his fall. But there is no reason for supposing that, had Sir Robert continued in power, his son would ever have become an ardent politician. As it was, he spoke but rarely, and only respectably; and although he seems occasionally to have interested himself genuinely in cases like the Byng trial of 1757, his function in politics is that of the chronicling spectator rather than the earnest actor. With the record that he exchanged his Cornish seat in 1744 for the family borough of Castle Rising, which he vacated in turn for the other family borough of King's Lynn, the account of his public life may be closed. In 1745 his father died, leaving him a house in Arlington Street (No. 5), with sufficient, if not excessive means. He continued to live the life he had already commenced as a collector and connoisseur, dabbling lightly in familiar verse and *jeux d'esprit*, trifling with history and art criticism, and corresponding voluminously with his friends, especially with Horace (afterwards Sir Horace) Mann, the British minister plenipotentiary at Florence, whose acquaintance he had made when on the grand tour. In 1747, after temporary trial of a summer residence at Windsor, he purchased, near Twickenham, the cottage which he gradually, by alterations and additions, elaborated into the well-known 'Gothic Castle' and 'curiosity shop' of Strawberry Hill. The transformation thus slowly effected, alternating with authorship, visits to Paris, the establishment of a private press at Twickenham, and the maintenance of an ever-growing correspondence, constituted the chief remaining occupations of his life, which was prolonged until March 1797, when he died in the house in Berkeley Square (the present No. 11) to which he had moved in 1779 from Arlington Street. In 1791, by the death of his eldest brother's son, he had become fourth Earl of Orford, but he was never married. He was buried at the family seat of Houghton in Norfolk.

Walpole's literary efforts are more various than distinguished. His essays in Moore's *World* exhibit a light hand, and he had gifts as a verse-writer. In such squibs as the *Letter from Xo Ho to his friend Lien Chi at Pekin* (1757), in which he anticipates Goldsmith's *Citizen of the World* by three years, he is at his best. In the romance of the *Castle of Otranto* (1764), which may be said to be the offspring of Gothic Strawberry, he not only had a happy idea, but was fortunate enough to inaugurate a new era of supernatural romance. His tragedy of *The Mysterious Mother* (1768), though in capable verse and extremely powerful, is too horrible in its subject for any but the strongest stomachs, and it is a curious contradiction of literature that a work so sombre and impassioned should have proceeded from the pen of so fastidious a personage as its author. Of his remaining books the *Anecdotes of Painting in England* (1761–71) [1780] and *Catalogue of Engravers* (1763), in which he systematised and made intelligible the voluminous data collected by George Vertue the engraver, are perhaps the most valuable, as they contain much which would not otherwise have been preserved. His memoirs of parts of the reigns of George II. and III., published posthumously in 1822 and 1845 respectively, although warped by personal and political prejudice, contain many facts and particulars which the writer's special opportunities of obtaining information render unusually interesting. He also compiled a *Catalogue of Royal and Noble Authors* (1758), *Fugitive Pieces in Verse and Prose* (1758), *Historic Doubts on Richard III.* (1768), an *Essay on Modern Gardening* (1785), &c. Some of the above were printed at his private press at Twickenham, from which, among other and very miscellaneous issues, he put forth editions of Grammont's *Memoirs* (1772); of the *Life of Lord Herbert of Cherbury* (1764); of

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Lucan's *Pharsalia*, with Bentley's notes (1760); and (for the Dodsleys) of the *Pindaric Odes* of Gray (1757), to whom at this date he had become reconciled. The books printed at the Strawberry Hill Press are the favourite toys of the collector.

Walpole's literary reputation, however, now rests chiefly upon his letters, of which those to Mann, continued assiduously for forty years—a correspondence not to be paralleled in the annals of the post-office—form the staple. His letters in the Cunningham edition extend to 2665; and it is known that there are others still unprinted. Yet, notwithstanding their voluminous character, their interest never flags. Croker, Walpole's persistent critic, reiterating Byron's opinion that they are incomparable, goes on to say that they are 'a perfect encyclopædia of information from the very best sources—politics from the fountain-head of parties, debates by the best of reporters, foreign affairs from an *habitué* of diplomatic society, sketches of public characters by their intimate acquaintance or associate, the gossip of fashionable life from a man of fashion, literature from a man of letters, the arts from a man of taste, the news of the town from a member of every club in St James's Street; and all this retailed, day by day, and hour by hour, to a variety of correspondents—*reddendo singula singulis*—according to their various stations, characters, and tastes, by a pen whose vivacity and graphic power is equalled by nothing but the wonderful industry and perseverance with which it was plied through so long a series of years.' To this may be added the verdict of another writer by no means favourable to Walpole personally: 'We expect,' says Lord Macaulay, 'to see fresh Humes and fresh Burkes before we again fall in with that peculiar combination of moral and intellectual qualities to which the writings of Walpole owe their extraordinary popularity.'

Walpole's life was that of a man of the world with a leaning to letters; and it has no great occurrences. In politics he was an aristocrat by instinct, and a republican by caprice. The former feeling was probably more genuine than the latter, but he was a wit and virtuoso above all. His truest sympathies were with his own class and circle; outside this they were imperfect. To those he liked he was a firm friend; but with many men of his age he reserved his closest confidence for the other sex (Madame du Deffand, Lady Ossory, the Misses Berry). Lord Macaulay made it the fashion to despise him as frivolous and selfish; but he has left us such a legacy of unfailing amusement that at this date the defects of his character need not greatly occupy us.

The *Letters* of Horace Walpole were collected into nine volumes in 1857–59 by Mr Peter Cunningham (Bentley). See also *Memoirs* of Horace Walpole, edited by Eliot Warburton (1852); and *Horace Walpole*, a memoir, by the author of this paper (1890).

Walpole, Sir Robert, afterwards Lord Orford, statesman, was the third son of Robert Walpole, M.P., and was born 26th August 1676 at Houghton in Norfolk, the seat of his ancestors since Stephen's reign. He received his education at Eton and at King's College, Cambridge. Through the death of his brothers he succeeded to the family estates on the death of his father, and in 1701 was returned to parliament for Castle Rising. In 1702 he was elected member of parliament for King's Lynn, which he continued to represent; and in 1705 he was nominated one of the council to Prince George of Denmark. In this latter capacity he appears to have won the esteem of Godolphin, Marlborough, and other Whig leaders. In 1708 he was appointed Secretary at War, and in 1710 Treasurer of the Navy. Shortly after this, however, his fortunes suffered a temporary eclipse; he was found guilty by the House of Commons of 'breach of trust and notorious corruption,' and on 17th January 1712 was expelled the House, and sent to the Tower; but it is certain the charge was due solely to party animosity. He had all along been a strong Hanoverian, and on the accession of George I. he was restored to fortune; he was made a privy-councillor, and had various other high offices conferred upon him. On the impeachment of Bolingbroke and others by his means, he became in 1715 Chancellor of the Exchequer and First Lord of the Treasury. A disunion in the cabinet having arisen in 1717, he resigned office, bringing in a Sinking-fund Bill on the day of his resignation. Out of office he has been charged with somewhat unscrupulous opposition. The Peerage Bill of the government (headed by Sunderland and Stanhope) having been defeated mainly by Walpole's resistance, Sunderland gave Walpole (1720) the post of Paymaster-general, and after the collapse of the South Sea Scheme the public looked to Walpole to restore order in public affairs; in 1721 he became First Lord of the Treasury and Chancellor of the Exchequer, and from this time to his final retirement in 1742 the life of Walpole may be said to be the history of England. His chief contribution to the development of the constitution was that, whereas heretofore ministers were regarded as equals amongst themselves, in his person and henceforward there was a prime-minister who gave to cabinet government the necessary unity. By systematic bribery (less in money amount than has been supposed) he secured a Whig House of Commons, and in the House of Commons secured majorities by the bribes both of money and of office. He it was who trained the Whig lords to rely not on their peers but on the Commons. His first successful trial of strength (1724) was with Carteret; later he held his own against the attacks of Bolingbroke and Pulteney; forced on the breach with his brother-in-law Townshend, who retired (1730) into private life; and quarrelled with Chesterfield (q.v.). He crushed Atterbury's plot; withdrew the grant for 'Wood's Halfpence' on the storm raised by Swift's *Drapier's Letters* (1723); failed to pass a famous Excise Bill (1733); and lost credit by his peaceful foreign policy, which Pitt and Newcastle attacked, the Prince of Wales also joining the opposition for other reasons. In 1740 a motion was made in the House to petition the king to remove Sir Robert Walpole 'from his Majesty's presence and counsels for ever.' This motion was negatived by a large majority; but the power of the great minister was seriously shaken. He resigned on 2d February 1742, when he was created Earl of Orford, with a pension of £4000 a year. His son had been created Baron Walpole in 1723. Charges of bribery were now brought against him, and a committee of investigation was ultimately appointed by the House of Commons; it consisted of twenty-one members, of whom only two were of his own party. The Report was against him, but it was unsupported by evidence, and proceedings were ultimately dropped. The rest of Walpole's life was spent in tranquillity and retirement. He died 18th March 1745. In private life he was amiable and good-tempered, but was essentially coarse-minded, as well as jealous; love of power appears to have been his ruling motive of action. He had strong common sense, with clearness of political vision, and seems to have understood the true interests of his country beyond any of his contemporaries; it was he who secured the permanence of the Revolution Settlement, and in his time peace was much needed by the country.

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See the articles GEORGE I., GEORGE II., ATTERBURY, CARTERET, TOWNSHEND, SOUTH SEA SCHEME, SINKING FUND; Coxe's *Memoirs of Sir Robert Walpole* (3 vols. 1798); monographs on him by Ewald (1877) and John Morley (1889); the Histories of Ralph, Stanhope, M'Carthy, and Lecky; works cited at HORACE WALPOLE; and Dr Jessopp's *One Generation of a Norfolk House* (1878), which deals specially with the Jesuit, Henry Walpole, hanged at York in 1595.

Walpole, SPENCER, historian, the son of the Right Hon. Spencer Horatio Walpole, who held office in Lord Derby's second and third administrations, was born 6th February 1839, and educated at Eton. He had a post in the War Office, was made inspector of fisheries in 1867, and in 1882 lieutenant-governor of the Isle of Man. He has written lives of the Right Hon. Spencer Perceval (his grandfather, 1873) and Lord John Russell (1889); two volumes in the 'English Citizen' series; and the valuable *History of England from the Conclusion of the Great War in 1815* (5 vols. 1878–86). He is LL.D. of Edinburgh.

Walpurga, ST, sister of St Wilibald, came with him from England to Germany, was abbess of Heidenheim, and died about 778. Her day is the 1st of May. Hence she has been accidentally associated with some strange popular superstitions connected with the 1st of May. During 'Walpurgis Night,' between 30th April and 1st May, the witches rode on broom-sticks and he-goats to the ancient places of sacrifice, to hold revel there with their master the devil. The best known of these witch-hills was the highest point of the Harz, the Brocken (q.v.), famous as the scene of the witches' Sabbath in Goethe's *Faust*.

Walrus, or MORSE (*Trichechus*), a genus of aquatic, web-footed (pinniped) Carnivores, sole living representative of a family (Trichechidæ) in many ways intermediate between the sea-lions and the seals. Two genera of huge extinct forms—Trichechodon and Alactherium—are also referred to the same family. The walrus resembles the seal in the absence of external ears, and the sea-lion in the way in which the hind feet are turned forward and used in hobbling along, but is at once distinguishable by the development of the upper canines into enormous tusks. Two species are distinguished—*T. rosmarus* in the Arctic seas, *T. obesus* in the North Pacific—but the two are closely alike.

A full-grown animal measures from 10 to 12 feet in length, and there is force in the old description which pictured the huge creature as 'large as an ox and thick as a hogshead.' The head is relatively small; the eyes, fierce to look at, are small; external ears are absent; the muzzle, with swollen upper lips, bears stiff whiskers, each hair as thick as a crow quill; the shoulder region is strong and massive; the short tail is hidden by a flap of skin which unites the hind legs; the limbs are webbed flippers with minute nails on all the digits except the three middle toes of the hind foot, where they are large and strong; the soles are bare and roughly furrowed; the hair is short, and varies in colour from light yellow above to chestnut brown below; the thick loose skin tends to become bare as the animal grows older, and is often much wrinkled and scarred. The dentition of the young is expressed in the formula $\frac{2}{3}$, $\frac{1}{1}$, $\frac{4}{4}$, but many of the teeth are lost or remain rudimentary, and the adult has only $\frac{0}{0}$, $\frac{1}{1}$, $\frac{3}{3}$. The tusks or upper canines are sometimes 2 feet long; they do not become conspicuous until the animal is about two years of age.

Head of Walrus.

Walruses live near the coasts among the Arctic ice, often on floating packs. They are gregarious in habit, posting sentinels, and aiding one another with all their strength against the attacks of men or polar bears—practically their only enemies. Apart from the fierce contests between rival males at pairing time, they are peaceful animals, but when molested or robbed of their young display much ferocity. In their sexual relations they are said to be monogamous; the young are born, after a gestation of about a twelvemonth, between the months of April and June, and normally there is but one at each birth. As the pathetic tales of the walrus-hunters amply testify, the females tend their offspring with solicitude, and will fight for them to the death, while the young during the prolonged period of suckling—lasting for one or two years—are tenaciously affectionate to their mothers. Walruses feed chiefly on bivalves, especially *Mya truncata* and *Saxicava rugosa*, which they dig up with their tusks, crush with their tongue and back teeth, and so sift that only the soft parts are swallowed. Besides bivalves, they also eat crustaceans, star-fishes, sea-urchins, worms, and the like, and have a strange habit of swallowing pebbles. Seaweeds have also been found in their stomachs, but this is probably the result of accident, and not indicative of a partially vegetarian diet. The young walrus kept for a time at the Zoo in London was not particularly discriminating in its diet, but showed no inclination for Algæ. The tusks are chiefly used in grubbing for food, but they are also formidable weapons, and according to the majority of observers they also serve to break breathing-holes in the ice, and to help the animals, which are as awkward out of water as they are agile in it, to climb among the rocks and ice. In the autumn the walruses have a period of fasting, the precise nature of which is not clearly known. The voice of the walrus is a roaring bark, 'between the mooing of a cow and the deep baying of a mastiff.'

Mainly as the result of ruthless destruction, the range of the walrus has been greatly narrowed, for they are no longer found so far south as they once were, and in many parts of the Arctic regions where they were once abundant they are now scarce. This is not to be wondered at, as there are records of hunts during which as many as a thousand walruses were captured. Sometimes they are surprised on land, and then they fall easy victims to the hunter; usually, however, they are attacked in the water by harpooning-boats, and this is often full of hazard. The oil of the walrus is used like that of seals; the hide is made into harness, ropes, and fishing-lines; the ivory tusks form weapons, utensils, and ornaments, and the flesh is eaten by the Eskimos and Tchuktchis. The word walrus is Norwegian (*hval-ros*, whale-horse), and another Norwegian name, *rosmar*, has been translated into one of the common English titles, sea-horse. The name *morse* is from the Russian *morss* or Lapp *morsk*. The Eskimos and Greenlanders call the creature Awûk from its cry.

Walsall, a municipal, parliamentary, and county borough of Staffordshire, is situated on an eminence above a small feeder of the Tame, 8 miles NNW. of Birmingham, 6 E. of Wolverhampton, and 123 NW. of London. An ancient place, but of modern development, it stands on the edge of the South Staffordshire coalfield, and manufactures

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saddlers' ironmongery and all kinds of saddlery, carriages, iron and brass, leather, &c., whilst in the vicinity are coal-pits, limestone-quarries, and brickyards. The public buildings include an Italian Renaissance guildhall (1867), county court-house (1869), post-office (1879), public library (1859), grammar-school (1554; rebuilt 1850), and cottage hospital (1878); and in 1886 a statue was erected of 'Sister Dora' (Miss Pattison, q.v.). Walsall was the scene in 1891–92 of an Anarchist conspiracy, for which four dynamiters were convicted. It became a municipal borough in Henry IV.'s reign; a parliamentary borough, returning one member, in 1832; and a county borough in 1888. Pop. (1851) 25,680; (1881) 54,402; (1891) 71,791. See F. W. Willmore's *History of Walsall* (1887).

Walsham, NORTH, a market-town of Norfolk, 14 miles N. by E. of Norwich. It has a large Perpendicular church with a ruined tower, and a market-cross (rebuilt 1600). Pop. 3612.

Walsingham, a small town of one long street and 1016 inhabitants in the north of Norfolk, 31 miles NE. of King's Lynn by rail. The Augustinian Priory, of which some ruins are left, was founded according to tradition in 1016. It contained a famous image of the Virgin, known as 'Our Lady of Walsingham,' to which many pilgrimages were made. Henry VIII. made the pilgrimage barefoot, and Erasmus' *Peregrinatio religionis erga* (Eng. trans. by Gough Nichols, 2d ed. 1875) records a visit of the great humanist. At Old Walsingham, a small village 1 mile NE., Roman remains have been found.

Walsingham, SIR FRANCIS, born at Chiselhurst, Kent, about 1536, studied at King's College, Cambridge, and afterwards travelled on the Continent, where he remained until the accession of Queen Elizabeth. Burghley, with his usual discernment, discovered his abilities, brought him into office, and sent him on an embassy to France in August 1570. He remained in Paris until May 1573, and discharged diplomatic duties with such consummate skill that he was, on the recommendation of his great patron, appointed one of the principal secretaries of state to Elizabeth. He was also sworn of the Privy-council, and knighted. In 1578 he was sent on an important embassy to the Netherlands, in 1581 to France, and in 1583 to Scotland. He was, with some reason, regarded by the adherents of Mary, Queen of Scots, as the most insidious of her enemies in the English council. He contrived to intercept most of her letters, and after deciphering them sent them to their destination, in order to obtain fresh intelligence from their answers. He soon held her safe in the toils. Up to Babington's (or, as some have called it, Walsingham's) conspiracy there was no evidence for charging her with being accessory to any of the plots formed against the life of Elizabeth. The real fountain-head of this conspiracy, and the chief confederates, were spies in the pay of Walsingham, and all the correspondence of Mary and her friends passed through the hands of Elizabeth's dexterous minister. After the discovery and execution of Babington and his confederates Walsingham went to Fotheringhay as one of the commission to try Queen Mary. She charged him with having forged the correspondence produced against her, when Walsingham rose in his place and solemnly called God to witness that he had not done anything unbecoming an honest man, and that he was wholly free from malice. Elizabeth signed her death-warrant with a jest on Walsingham's hatred of the Queen of Scots. She had ordered Davison to bring her the warrant, and when she had signed it she said: 'Go; tell all this to Walsingham, who is now sick; though I fear he will die for sorrow when he hears it.' Walsingham was distinguished even among the ministers of Elizabeth for acuteness of penetration, extensive knowledge of public affairs, and profound acquaintance with human nature. His administration of foreign affairs was founded on the system of bribery, espionage, and deception. He is said to have had in his pay fifty-three agents and eighteen spies in various countries; and no minister was better informed of the intrigues of foreign courts. Notwithstanding this diplomatic duplicity, which was then universal among public men, Walsingham's personal integrity and disinterested patriotism are undoubted. He was of strict morals, favoured the Puritan party, and in his later days gave himself up to religious meditation. He retired from public affairs some time before his death, and resided at his house in Barn Elms. He died in Seething Lane, London, April 6, 1590. Elizabeth was ready enough to acknowledge his diligence, genius, and important services, yet she kept him poor. There remain in the British Museum (Harleian MSS.) various letters from Walsingham complaining of his being wholly unable, on his scanty appointments, to support his establishment, though very inadequate to his dignity of ambassador in France. Camden says he died so far in debt that he was buried privately by night in St Paul's Church, without any funeral solemnity. The queen was chary even in conferring honours upon him, for he received nothing but his knighthood, and held no offices when he resigned the charge of foreign affairs. His daughter Frances became successively the wife of Sir Philip Sidney, of the brilliant and unfortunate Earl of Essex, and of the brave soldier, Richard de Burgh, fourth Earl of Clanricarde.

Walsingham, THOMAS, precentor of the abbey of St Albans under Richard II., and afterwards prior of the cell of Wymundham, one of the most eminent of the famous historians of St Albans. His *Historia Anglicana* forms vols. i. and ii. of the *Chronica Monast. S. Albani* (Rolls series, 1863–64). For the first fifteen years of Richard II. (1377–92) it is an authority of the highest value; the earlier period is grounded chiefly on the *Annals* of St Albans; the concluding portion, from 1393 to 1492, contains many inaccuracies, so much so that its editor in the Rolls series thought it the work of another hand. But Mr Gairdner holds that the writer of both is one and the same.

Walter, JOHN. See TIMES.

Walters, LUCY. See CHARLES II.

Waltham, a market-town of Essex, on the Lea, 13 miles N. by E. of London. Called also Waltham Abbey and Waltham Holy Cross, it retains the nave of a stately Norman church, which, rebuilt by Harold in 1060 for a collegiate chapter, served from 1177 for an Augustinian abbey. A miraculous cross had been brought here from Montacute in Somerset; and here probably Harold was buried. Both the nave and a Decorated lady chapel have been restored; they serve for the parish church, of which Bishop Hall and Thomas Fuller were incumbents. Waltham has memories also of Cranmer and Henry VIII. Waltham Cross (see Vol. III. p. 583) is 1¼ mile W., in Hertfordshire; and 1 mile farther W. is Theobalds (q.v.). The Lea's many channels form a network of islands, on which are vast gunpowder-mills belonging to government. Enfield (q.v.), in Middlesex, is also near; and market-gardening is largely carried on. Pop. (1851) 2329; (1891) 6066. See works by Fuller (1655; ed. by Nichols, 1837) and Bishop Stubbs (1860).

Waltham, a town of Massachusetts, on the Charles River, 10 miles by rail WNW. of Boston,

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with manufactories of cottons and watches. Pop. (1880) 11,712; (1890) 18,707.

Walthamstow, an Essex parish, 6 miles NE. of St Paul's. Pop. (1851) 4959; (1891) 46,346.

Walther von der Vogelweide, best of the Minnesinger and greatest German poet of the middle ages, was born about 1160, probably in Tyrol; but the place of his birth is unknown, nor has it been proved where the Vogelweide was from which he took his name. In 1180–98 he was at Vienna, at the court of the Dukes of Austria, and in high favour there; later we find him at Mainz and Magdeburg; in 1204 he outshone his rivals in the great poetical contest at the Wartburg (see MINNESINGER). He sided with the Guelph emperor Otto IV. till his cause was utterly lost, but afterwards made friends with the victorious Hohenstaufen, Frederick II., who gave the poet a small estate. Here he died about 1230, and was buried in the cathedral of Würzburg. Love was his main theme, as that of the other Minnesinger, and he sang both sweetly and with warm human feelings in varied and artistic forms of verse. But he could also stir the hearts of his contemporaries by his patriotic pride in the Fatherland, by his praise of justice, and his support of national duty. He was even regarded by some as having exercised by his verse a too great influence on public feeling in political matters. He was also famous as an inditer of weighty proverbs and maxims.

There are editions of his works by Lachmann (1827), Wackernagel and Rieger (1862), Pfeiffer (1864), Wilmanns (1883), and Paul (1882); translations by Simrock, Weiske, Schröter, Wenzel, and others; and monographs on Walther by Uhland (1822), Pfeiffer (1860), Rieger (1863), Menzel (1865), and Wilmanns (1882), as well as a full bibliography by Leo (1880).

Waltner, CHARLES, etcher, was born at Paris, 24th March 1846, and studied painting under Gérôme, but, after working as a copperplate engraver, found his true vocation in etching. He became famous by etchings after Rembrandt, Rubens, Van Dyck, and Velazquez; amongst his best-known etchings are those of Millet's 'Angelus,' and Munkacsy's 'Christ before Pilate.'

Walton, BRIAN, editor of the great London Polyglott Bible, was born at Seymour in Yorkshire in 1600, was educated at Magdalene College and Peterhouse, Cambridge, and became in 1626 rector of St Martin's Orgar in London, to which was added the rectory of Sandon in Essex in 1636. In 1641 he was sequestered, and he thereupon found refuge in Oxford, afterwards in his second father-in-law's house in London, where he devoted himself to his great work, which came out by a subscription of ten pounds a set in six folio volumes (1654–57). He had been aided by Usher, Lightfoot, Pocock, and many other scholars, and Cromwell himself favoured the scheme, as acknowledged in the original preface. Walton was consecrated Bishop of Chester in December 1660, and died in London, 29th November 1661. Some portions of Walton's Polyglott are printed in seven languages, all open at one view. No one book is given in nine languages, but nine are used in the course of the work, Hebrew, Chaldee, Samaritan, Syriac, Arabic, Persian, Ethiopic, Greek, and Latin. Dr Edmund Castell's *Lexicon Heptaglotton* (2 vols. folio, 1669), giving lexicons and grammars of the languages contained, is its necessary complement. Other works were his *Introductio ad Lect. Orient.* (1654) and *Considerator Considered* (1660), an answer to Owen, who found things prejudicial to the faith in the *Prolegomena* to the Polyglott and in the large number of various readings admitted.

See the Life by H. J. Todd (2 vols. 1821), the second volume containing a reprint of the answer to Owen.

Walton, IZAAK, the 'Father of Angling,' was born at Stafford, 9th August 1593. Of his early years we know nothing save that his father died early; but in 1624 we find him settled in Fleet Street, near Chancery Lane, London, carrying on business as a linen-draper. Later he removed into Chancery Lane itself, and is described in the lease as a sempster or milliner. In the end of 1626 he married Rachel Floud, a great-grand-niece of Cranmer, and it is not improbable that from her uncle George Cranmer, who had been a pupil and friend of Hooker, he may have derived the materials for his life of the great divine. His wife died in August 1640 after giving birth to an infant daughter—the two sons she had borne him were already dead. About 1644 he retired from business with such a modest competence as sufficed for his simple wants, and in 1647 he married Ann Ken, half-sister of the future bishop, then a boy ten years old. She bore him a daughter, Anne, who married Dr Hawkins, a prebendary of Winchester, and died in 1715, and two sons, of whom the younger survived him, became a canon of Salisbury, contributed largely to Walker's *Sufferings*, and died in 1719. Walton lost his second wife in 1662, and buried her in Worcester Cathedral. Wood tells us he spent most of his time 'in the families of the eminent clergymen of England, of whom he was much beloved.' He had been a close friend of Dr Donne, vicar of St Dunstan's, the parish he lived in, and was urged by Sir Henry Wotton to collect materials for the life of the poet-dean. Donne's sermons being about to be reprinted without a life, Walton himself took up the task, left untouched by Sir Henry at his death in 1639, and so produced under the spur of necessity one of the most delightful biographies in miniature within English literature. Already in 1631 he had mourned Donne's death in an *Elegy*, in which he calls himself his convert. Others among his intimate friends were Morley and Sanderson, after the Restoration bishops of Worcester (then Winchester) and Lincoln, while yet another friend, Dr King, was reinstated in the see of Chichester. In his later years he lived much at Winchester, closed his blameless life there in the house of his son-in-law, 15th December 1683, and was buried in Prior Silkstede's chapel in the south transept of the cathedral.

The first edition of *The Compleat Angler, or the Contemplative Man's Recreation*, appeared in 1653; the fourth, grown from thirteen chapters to twenty-one, in 1676. The latter contained also Charles Cotton's 'Second Part of the Complete Angler, being Instructions how to Angle for Trout or Grayling in a Clear Stream.' To the two original interlocutors, 'Piscator' and 'Viator,' Walton had already added in the second rewritten and greatly enlarged edition (1655) the falconer ('Auceps'), and changed 'Viator' into 'Venator.' A fishing expedition to the Hertfordshire streams between Ware and Waltham furnishes a slight narrative framework for the book, and after each of the three, the bird-catcher, the hunter, and the fisher, has commended in turn his own recreation, Piscator adopts Viator as his pupil in the art of angling, and discourses to him on the otter and chub, the trout, the artificial minnow and flies, the umber or grayling, the salmon, the luce or pike, the carp, the bream, the tench, the perch, the eel, the barbel, the gudgeon, ruffe, and bleak, the roach, dace, and caddis, the minnow or penk, loach, and bull-head or miller's thumb, of the various English rivers, of fish-ponds, and of rods and lines. The discourse is interspersed with scraps of dialogue, moral reflections, quaint old verses, songs, and sayings, and idyllic glimpses of country-life, and the whole breathes such cheerful piety and contentment, such sweet freshness and simplicity as

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to give the book a perennial charm altogether its own. Walton loved God and man with an unaffected simplicity of mind which cast a radiant atmosphere of happiness around all the idyllic pictures that he saw, for the charm of the book is not so much in the matter, or even the manner, as the unconscious picture of the writer's own disposition. The book was the delight of Charles Lamb's childhood. Writing to Coleridge, he says 'it breathes the very spirit of innocence, purity, and simplicity of heart. . . . It would sweeten a man's temper at any time to read it; it would Christianise every discordant angry passion.'

Not less exquisite and indeed unique are his *Lives*—of Donne (1640), Wotton (1651), Hooker (1652), Herbert (1670, when the four were collected), and Sanderson (1678)—'Satellites burning in a lucid ring Around meek Walton's heavenly memory.' This was one of Dr Johnson's favourite books, and Boswell tells us he counted the Life of Donne as the most perfect of the five.

In the edition of Mr Thomas Westwood's *Chronicle of 'The Compleat Angler,'* published on the two hundredth anniversary of Walton's death, there are enumerated as many as 97 editions, as compared with 53 in the first edition (1864). Of these need only be named those by [Sir] John Hawkins (1760); Major (1824, 1835, 1844); Sir Harris Nicolas, with a good Life of Walton (1836); Dr George W. Bethune (New York, 1847); Ed. Jesse and H. G. Bohn (1856); Dowling (1857); and a fac-simile of the original ed. (1876). Of the *Lives* there are editions by Dr Thomas Zouch, with a poor Life (York, 1796), Major (1825), and A. H. Bullen, with W. Dowling's Life (1884).

Walton-on-Thames, a Surrey village, 17 miles (by water 28) SW. of London. Its church has some interesting monuments, and Lilly is buried here. Pop. of parish, 7000.

Waltz (Ger. *walzer*, Fr. *valse*), a German dance, which first became a fashionable dance in other countries in the early part of the 19th century, being introduced into England in 1813. The *Valse à Deux Temps* is a form of the waltz not so graceful as the older one, because not so correspondent to the rhythm of the music. Strauss, Gungl, and Godfrey are well-known waltz-composers; and there are idealised concert-waltzes, not suited for dancing, by Chopin, Liszt, Brahms, &c.

Walvisch Bay (Dutch, 'Bay of Whales'), anglicised as Wallish Bay, or, more completely, Walwich Bay, a territory of 480 sq. m. on the west coast of Africa, 420 miles N. of the mouth of the Orange River. Declared British in 1878, it is surrounded by the German territory of Damaraland, and annexed to Cape Colony in 1884. The bay affords a secure anchorage. Pop. 800.

Wampum, a name given to shells, about an inch long and twice the thickness of a knitting-needle, used as money by the American Indians.

Wandering Jew. The legend of a Jew who cannot die but must wander till the day of judgment, for an insult offered to Christ on the way to the Crucifixion, is not ancient nor wide-spread. There is no trace of it in the early middle ages either in the East or West, and the popularity of the story is mainly confined to some countries of north-western Europe—Germany, Scandinavia, the Netherlands, and France. The first Wandering Jew, as Schoebel points out, was Cain, whose curse offers a striking analogy. Among the Arabs Samiri, the maker of the Golden Calf, is a similar homeless wanderer. Still there is no direct link between these and the modern story. The early imagination, not content with the Gospel narrative, amplified both the antecedent and the subsequent incidents, and invented many new episodes, which clustered round the names of Judas, Pilate, Mary, Joseph, and Jesus himself. An Italian legend, which M. Paris thinks of great antiquity, tells how a Jew named Malchus gave Jesus a blow with an iron glove, and how ever since he has lived underground, endlessly turning round and round a pillar till the day of judgment. This story, which has given rise to proverbs, and appears in Sicilian folk-song, may be essentially the same legend which first took historical form in the version of Matthew Paris. He tells us in his *Historia Major* (completed 1259) that an Armenian bishop visited England in 1228, and among other wonders of his country told of one Cartaphilus who had been present at the Passion being then alive and well known to himself. He was a door-keeper in the palace of Pilate, and as Jesus was being led past to His crucifixion he struck Him with the words 'Go, Jesus: go on faster.' To which Jesus answered, 'I go, but thou shalt wait till I return.' Cartaphilus was baptised by Ananias with the name of Joseph, and settled in Armenia, where he had often sat at the archbishop's table. Thirty years old when he insulted Christ, whenever he reaches a hundred he falls into a faint, and on recovery finds himself at the age he was when his doom was pronounced. Some years later we are told that the archbishop's brother visited England, and some of his attendant monks confirmed the story. We next find it repeated in the *Chronique* by Philippe Mouskets, written at Tournai about 1243. Schoebel suggests that the name Cartaphilus (Gr., 'very dear') must have had its origin in the disciple 'whom Jesus loved,' of whom it will be remembered Jesus said to Peter, 'If I will that he tarry till I come, what is that to thee?' (John, xxi. 22). An analogous saying of Jesus, which seems to have strongly impressed the early imagination, is that recorded in Matthew, xvi. 28. When facts had belied the natural meaning of this saying, the popular belief sought to justify it notwithstanding, by assuming that certain witnesses of the Passion of Christ had been miraculously saved from death, whether as a reward or as a punishment. The one suspicious fact against the good archbishop on whom this story is fathered is that there is no trace of it in the East, even in the vast compilation of Jean d'Outremeuse.

Three hundred years later we find the next development of the legend in the story that the Wandering Jew was seen at Hamburg in 1547 by Paul von Eitzen, Bishop of Sleswick, listening to the sermon, tall, ragged, gaunt, bare-footed, his long hair falling over his shoulders. He had been a shoemaker at the death of Jesus, his name was Ahasuerus. He spoke the languages of all countries, was never seen to laugh, and rebuked blasphemies against the name of Christ with awe-struck severity. This story was widely current about the beginning of the 17th century, and a form of it is extant, with full details, vouched for by a letter signed Chrysostomus Dudulæus Westphalus, and dated Refel [Reval], 1st August 1613. From this time forward we meet with many precise versions and variations. One of the most celebrated appearances was that to two grave citizens together at Brussels in 1640. Here the name given to him is Isaac Laquedom, which Böttcher thought likely to be a corruption by some half-learned man from the Hebrew (*la-kĕdem* = the former world). The German *Volksbuch* versions had been early translated into French, Dutch, Danish, Swedish; in English at least they inspired a ballad in Percy's *Reliques*. There is a beautiful French *complainte* on the subject, apparently of Belgian origin, which gives him again the name of Laquedom. Yet another name given him is Buttadeus—the Bedeus of the Transylvanian Saxons, the Italian Buttadio, the Boudedeo of the beautiful Breton *gwerz* translated by M. Luzel.

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Further appearances are recorded at Beauvais, Leipzig, Lübeck, Moscow, Madrid, and even Hull—a tract of 1769 'authenticated by four ministers of Hull in Yorkshire,' tells how 'some time since' he visited Hull and was locked up, but the prison doors flew open to him whom the Almighty had denied a resting-place. The *Turkish Spy*, writing from Paris in 1644, gives an account of a conversation with him as Michob Ader in several languages, five or six hours together in Arabic. The 'Younger Brother of Time' said there was scarce a true history to be found, and unhappily he could give no satisfactory account of the whereabouts of the lost Ten Tribes.

It is of the essence of popular tradition to confound analogies, and so we find the Wandering Jew confounded with figures of mythology, converted Prometheus-like into an emblem of humanity, a personification of the Jewish race itself. Stories of deathless saints and heroes are to be found in the early history of every people—Enoch, Elijah, Arthur, Charlemagne, Barbarossa. And in such conceptions as Cain fleeing from the face of man with the brand of murder on his brow, the Wild Huntsman on land, and the Flying Dutchman on sea we may see how readily the imagination lends itself to the fundamental horror in the fate of the Wandering Jew.

The theme touched the imagination of Goethe, but he abandoned it for Faust. The greatest man who has treated it artistically is Edgar Quinet (*Ahasuerus*, 1833). Others are A. W. Schlegel, Chamisso, Lenau, H. C. Andersen, Klingemann, and Ed. Grenier. The introduction of the Wandering Jew in Sue's romance is the crowning absurdity of that absurd book—his death is an outrage to dramatic consistency which makes his whole history ridiculous. George Croly's novel, *Salathiel*, is named only because it is English. See Dr Grässe, *Die Sage vom Ewigen Juden* (1844), F. Helbig, *Die Sage vom 'Ewigen Juden,' ihre poetische Wandlung und Fortbildung* (1874); C. Schoebel, *Le Légende du Juif-Errant* (1877); Professor D'Ancona in *Nuova Antologia* (Oct. 1880); but especially the admirable brochure by Gaston Paris, *Le Juif-Errant* (1880). The fullest English account (made fuller by plentiful irrelevances) is in Moncure D. Conway's *Wandering Jew* (1881). There is a slight paper in Baring-Gould's *Popular Myths*. See also Champfleury, *Histoire de l'Imagerie Populaire* (1869).

Wanderoo (*Macacus silenus*), a catarrhine monkey, a native of the Malabar coast of India.

Wanderoo (*Macacus silenus*).

It is 3 feet long to the tip of the tail, has a slim body, pink buttocks, dark hair, and a great mane of long whitish hair round the face. Fabulous stories are current of its cunning and mischievousness, and some captive ones have certainly been savage and vicious. Others are described as exceptionally intelligent—a divergency probably due to their treatment. The Rhesus Monkey (q.v.) is another Macacus. The name Wanderoo, an English spelling of the Singhalese word for 'monkey,' is also given to some smaller monkeys of Ceylon.

Wandiwash. See COOTE.

Wantage, a market-town of Berkshire, in the Vale of the White Horse, 26 miles W. of Reading. A steam tramway (1875), the first in England, and 2½ miles long, connects it with Wantage Road station; and it has a good 14th-century church, a corn exchange (1865), a grammar-school (1597; rebuilt 1850), an Anglican home for penitents, and a marble statue (1877) of King Alfred, who was born here, executed by Count Gleichen, and unveiled by the Prince of Wales. Bishop Butler was also a native. Wantage manufactures agricultural implements. Pop. (1851) 3056; (1891) 3669.

Wantley. A mock heroic ballad, whose merits deserve no celebrity, printed in Percy's *Reliques*, celebrates a fight in which the dragon of Wantley was worsted and slain. The ballad itself (early 17th century) is a vulgar but justifiable satire on such extravagant fictions, and Percy prints a dubious story of its origin being a lawsuit concerning a claim of tithes made by the Wortley family, whose seat, Warncliff Lodge (locally Wantley), is 6 miles from Rotherham in Yorkshire. If so, the More whose heroism is celebrated may have been attorney or counsellor in the popular cause.

Wapenshaw, in ancient Scottish usage, a periodical gathering of the people within various areas for the purpose of seeing that each man was armed in accordance with his rank, and ready to take the field when required. Numerous statutes regulate the wapenshaws, and under the later Stuarts attendance was rigorously enforced. Sports, archery, &c. were indulged in at such meetings. The name has been in some places revived for volunteer meetings and shooting competitions.

Wapentake (Sax. *wæpen*, 'arms,' and *tac*, 'touch'), a name given in Yorkshire (q.v.) to the territorial divisions of the county, similar to what in most other English counties are called *hundreds*, and in the more northern counties *wards*.

Wapiti (*Cervus canadensis*), a species of deer of large size, being 4½ feet in height at the shoulder.

Wapiti (*Cervus canadensis*).

It is a native of North America, found as far south as Carolina, and as far north as 56° or 57° N. lat.

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It is yellowish brown on the upper parts; the sides gray; a pale yellowish patch on each buttock, bounded by a black line on the thigh; the neck a mixture of red and black, with long, coarse, black hair falling down from it in front like a dewlap; a black mark at each angle of the mouth. The hair is crisp and hard, but there is a soft down beneath it. The antlers are large, much like those of the stag, but the first branch bends down almost over the face. The wapiti is called *elk* and *gray moose* in some parts of America, although very different from the true elk or moose deer. It is found chiefly in low grounds, or in parts of the forest adjacent to savannahs and marshes. Its flesh is coarse and dry. The hide makes excellent leather.

War, a struggle by force of arms carried on between different states (international war) or tribes, or between different parties in the same state (civil war). The laws of war are treated of in this work in a long series of articles, such as those on International Law, Articles of War, Blockade, Contraband, Enemy (where the declaration of war is dealt with), Martial Law, Neutrality, &c. The means of conducting warfare come under such heads as those of Army, Navy, Fortification, Siege, Strategy, Tactics. Many of the great wars of history have separate articles—Crimean War, Peninsular War, Seven Years' War, Thirty Years' War, War of the Spanish Succession, Wars of the Roses, &c.—or are discussed in the histories of the countries they affect (Carthage, Rome, France, Germany, Turkey, United States, &c.) and of the commanders who waged them (Alexander, Cæsar, Hannibal, Frederick the Great, Napoleon, Wellington); see, too, the articles on great battles, Waterloo, &c.

It is difficult to estimate even approximately the cost, directly and indirectly, of great wars, apart from the loss of life. But some notion of the war expenditure of Great Britain may be gathered from the table at NATIONAL DEBT, showing the amount of the debt at successive dates. The cost of the Russian war to Britain is set down at close on £70,000,000; the loss in men was 20,526, of whom 12 per cent. died in battle, the rest in hospital. The American civil war was estimated to have cost the nation 600,000 lives and $10,000,000,000. Besides the fearful loss in men (290,000) and cost in money (£316,000,000) to France of the Franco-German war, there was added the war indemnity of 5000 millions of francs. In the one bloody battle of Gravelotte alone the victorious Germans lost 328 officers and 4900 men dead, and 571 officers and 14,000 men wounded; the French loss was 13,000 men. For a list of great battles, see BATTLE. See also GENEVA and the lists of articles appended to ARMY and to INTERNATIONAL LAW; and works on the Art of War by Clausewitz (trans. 1873), Jomini (trans. Phila. 1875), Hamley (1878), Wheeler (New York, 1880), Derrécagaix (trans. Washington, 1889), Maurice and Fitzgerald (1889), Douglas Owen (1890), and Köhler (3 vols. 1888–90).

THE WAR DEPARTMENT has charge of everything connected with the army. In Great Britain it is a department of the state under a cabinet minister, the Secretary of State for War (abroad, war minister), assisted by a permanent and a parliamentary under-secretary. The War Office, the manufacturing departments, the Ordnance Survey, all forts, barracks, stores, government land used for military purposes, and vessels employed in carrying ordnance stores, &c. are under the War Department as well as the army itself. The letters W D with a broad arrow between them is the mark by which the War Department property is distinguished.

THE WAR OFFICE is the immediate office of the Secretary of State for War, who, under the sovereign, is the head of the army, and responsible for everything connected with it. Before the Crimean war the administration of the army was divided amongst the War Office, Horse Guards, Ordnance Office, Treasury, Colonial Office, and Foreign Office. In 1856 it was concentrated in the War Office, which was divided into three great branches representing roughly men, money, and *materiél* under the Officer Commanding in Chief, the Financial Secretary, and the Surveyor-general of the Ordnance respectively. By an order in council of 21st February 1888 the War Office was reorganised, the Surveyor-general of the Ordnance abolished, and his duties divided between the Finance and Military departments—the first, under the Financial Secretary, to include the divisions of the Accountant-general and Directors of Contracts, Clothing, and Ordnance Factories; the second, under the Commander-in-Chief, those of the Adjutant-general, or Chief Staff Officer (discipline, enlistment, military education, &c.), the Military Secretary (appointments, honours, &c.), Quartermaster-general (supplies, quarters, transport, &c.), Inspector-general of Fortifications (forts, lands, submarine mines, &c.), Director of Artillery (warlike stores, inventions, &c.), Director of Military Intelligence, Directors-general of the Army Medical Department and of Military Education, Chaplain-general (Church of England only, other denominations are under the permanent Under-secretary of State for War), and Principal Veterinary Surgeon. The total War Office vote in the estimates for 1892–93 was £257,800. Of this the civil employees (some 500 in number) absorb £166,841, the military (75 officers and 92 clerks) £80,427.

Warasdin (*Varasdin*), capital of a county in the Austrian province of Croatia, upon the right bank of the Drave, 35 miles NE. of Agram, with a cathedral and some manufactures; pop. 10,371. Seven miles south-west is the warm sulphurous spring of Varasdin-Töplitza.

Warbeck, PERKIN, a pretender to the crown of England, acknowledged in his own confession that he was a native of Tournay, son of one John Osbeck. In 1490 he appeared at the court of the Duchess of Burgundy, sister of Edward IV. of England, and here professed to be Richard Duke of York, the younger of the two sons of Edward IV. murdered in the Tower. This prince was born in 1472, and the claimant would no doubt be about the same age. In 1491 he landed at Cork, where he was welcomed. Next year he was received at the court of Charles VIII. of France as Duke of York; and from the court of Burgundy, where he was treated as nephew of the duchess, he made an ineffectual landing in Kent (July 1495). He next went to Ireland, then to Scotland, where James IV. gave him his kinswoman, Catherine Gordon, the daughter of the Earl of Huntly, in marriage. In 1498 he sailed by Ireland to Cornwall in order to profit by the disaffection there, attempted to besiege Exeter, then went on to Taunton, but ran away with un-Plantagenet poltroonery by night to the sanctuary at Beaulieu in Hampshire. He surrendered on promise of pardon, and was subjected to an easy imprisonment. Next year he managed to escape, but was caught at Sheen. He was thrown into the Tower, and it was more than probable an opportunity was purposely afforded him to plot an escape with the imprisoned Earl of Warwick. He was executed in November 1499, as was also the ill-fated Warwick. Thus, says Bacon, did 'this winding ivy of a Plantagenet kill the true tree itself.' See James Gairdner's appendix to his *History of Richard III.* (1878).

Warble-fly. See BOT.

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Warbler, a popular name often applied to all the birds of the family Sylviidæ (q.v.; sometimes called by the French name of Fauvettes), many of which, however, commonly receive other popular names, as the Blackcap, Nightingale, Hedge-sparrow, Redbreast, Redstart, Stonechat, Wheat-ear, Whitethroat, &c. (q.v.), while many receive the name Warbler with some adjunct—Reed-warbler, &c. The more typical genera comprise birds of small size and plain plumage, usually alike in both sexes; most of them are migratory, going a long way south of their breeding-haunts to winter; for instance, the Siberian Chiff-chaff (*Phylloscopus tristis*) winters in India. Such genera are Sylvia, to which the Blackcap and Garden-warbler belong; Locustella, of which is the Grasshopper-warbler (*L. nævia*), not unfrequent in many parts of England, and found also in the south of Scotland and in Ireland. It is found in most parts of the centre and south of Europe, at least during summer, being a bird of passage. It is of a greenish-brown colour, the centres of the feathers dark brown, producing a spotted appearance; the lower parts pale brown. It is a shy bird, hiding itself in hedges and bushes, but very active, often darting out like a mouse from the bottom of the hedge, and receives its name from its chirping, grasshopper-like note. The genus Acrocephalus has, like the foregoing, a rounded tail; the species frequent watery places, and are known as Reed-warblers. Some of them nearly equal a thrush in size. The Sedge-warbler (*A. schænobænus*) is the most common British species, and is generally found in thick patches of reeds or willows in marshes, or in other situations close to water, and where the aquatic herbage is thick and strong. It abounds on the marshy

Reed-warbler (*Acrocephalus streperus*).

banks of the Thames. The Reed-warbler (*A. streperus*) is found in summer in marshy situations in the south of England; it abounds in Holland and in many parts of Europe, and its range extends to the north of India. It is of a uniform pale brown, with a tinge of chestnut; the chin and throat white; the under parts pale buff colour. Its nest is remarkable; it is attached to the stems of three or four reeds, and formed by winding grass or the branches of reed panicles together with a little wool, and is conical and deep, so that the eggs or young may not be thrown out when the reeds are shaken by the wind. The Phylloscopi feed chiefly on small insects and larvæ which infest the foliage of trees; they are small species, and in colour vary above from olive-green to brown, and below from yellow or greenish yellow to white. They build semi-domed nests. The Chiff-chaff (*P. collybita*), so named from its two-noted cry, is a familiar early migrant to Britain. The Wood-warbler, also known as Wood-wren (*P. sibilatrix*), is common in the wooded districts of England in summer, particularly in old plantations of oak and beech. The Willow-warbler (*P. trochilus*) is very common in the south of England in summer, but more rare in northern parts of Britain. It frequents woods, shrubberies, thick hedgerows, and bushes, but builds its nest on the ground. Numerous species of warblers are found in North America, but these belong to a quite distinct family (Mniotiltidæ) which appear to graduate into the Tanagers (q.v.). They are birds of brighter plumage than the Old-World warblers, but resemble them in their habits, and are also migrants. Not a few of the species are therefore reckoned among the birds of the West Indies, just as some of the European species are found in Africa. Asia has many species of warblers, among which some of the European species are included. Australia has many species of warblers, some of which (Malurus) are of very beautiful plumage, but these are sometimes made a distinct family (Maluridæ). See Howard Saunders, *Manual of British Birds.*

Nest of Reed-warbler.

Warburton, Eliot, was born in 1810 at Aughrim, County Galway, the eldest son of the inspector-general of constabulary in Ireland. He studied at Cambridge, and was called to the bar, but soon devoted himself to literature, travel, and the improvement of his Irish estates. His eight works include *The Crescent and the Cross* (1844), a spirited description of eastern lands; *Memoirs of Prince Rupert* (1849); and *Darien, or the Merchant Prince* (1851). He was sailing for Panamá, as an agent of the Atlantic and Pacific Company, when he was lost in the steamship *Amazon*, burnt off Land's End on 4th January 1852.

Warburton, William, a famous but not a great English divine, was born at Newark, the son of its town-clerk, December 24, 1698. He received his education at Oakham and Newark grammar-schools, and at sixteen was articled to an attorney. He seems to have practised his profession for some years at Newark, while diligently keeping up his studies, and he was ordained deacon in 1723, priest in 1727. Presented by Sir Robert Sutton to the rectory of Brant-Broughton in Lincolnshire, he gave himself here for eighteen years to severe and unbroken study. His *Alliance between Church and State* (1736) first called attention to his powers, but it was *The Divine Legation of Moses* (books i.–iii. 1738; iv.–vi. 1740) which formed the sure foundation of his fame, although Gibbon could describe it in his autobiography as 'a monument, already crumbling in the dust, of the vigour and weakness of the human mind.' His object was to prove the divine authority of Moses, but he wanders discursively into all manner of subsidiary inquiries, and fortifies defects of argument with vulgar abuse of all manner of adversaries, especially in his foot-notes—his 'places of execution.' A characteristic excursion was the explanation of Virgil's descent of Æneas into the shades as an allegorical version of initiation

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as a law-giver into the Eleusinian mysteries, which called forth the anonymous *Critical Observations on the Sixth Book of the Æneid* (1770) of the yet untried historian Gibbon. The Deists had made much of the absence from the Old Testament of any distinct reference to a future life, but Warburton makes bold to take this itself as a proof of divine authenticity, for no mere human legislator would have omitted such a sanction, and therefore the motive of Moses in leaving out so necessary a condition of morality must needs have been that he expected a further revelation. Of this preposterous work books vii. and viii. never appeared; book ix. was only published posthumously in 1788. It displays no speculative power or profundity of thought, but merely a vigour in verbal logic, and a reading multifarious and vast indeed, but inaccurate. This man has 'monstrous appetite and bad digestion' said Bentley. Insolent, dogmatic, arrogant beyond belief, prone to paradox, devoid of any spiritual insight, intolerant of any difference of opinion, he brings to theological controversy the habits of mind of the attorney's office, brow-beating his opponents with abuse and imputation, reading, says Mr Leslie Stephen, the Bible precisely like an act of parliament. In a series of letters in the *Works of the Learned* for 1739 he voluntarily defended the orthodoxy of Pope's *Essay on Man* in answer to Crousaz, and the poet was so grateful at being proved to be not a fatalist that he rewarded his boisterous apologist with a close and unbroken friendship, leaving him at his death in 1744 his literary executor—a bequest which Johnson estimated at £4000. This friendship also gave him an introduction to the wealthy owner of Prior Park, Ralph Allen, whose favourite niece, Gertrude Tucker, he married in 1745. Warburton's preferment was now rapid: he became successively Preacher of Lincoln's Inn (1746), Prebendary of Gloucester (1753), King's Chaplain (1754), Prebendary of Durham (1755), Dean of Bristol (1757), finally, through the nomination of Allen's warm friend, William Pitt, Bishop of Gloucester (1759). He was remiss in his episcopal duties, but the standard of that age was not high, and Hurd, who had the honesty to be as obsequious in his flattery to him dead as living, counts the loss to his diocese gain to the church. The grace of apostolical succession did not drive out his fighting spirit, and he wore out his days in endless warfare with Hume, Jortin, the Deists wholesale, Voltaire, Lowth, and Wesley. The most famous of these struggles was that with Lowth, who was as much his superior in scholarship as in courtesy. Lowth's famous *Letter* (1765) remains scarce rivalled to this day in polite raillery and point, and Warburton for once had the prudence to offer no retort. His *Doctrine of Grace* (1762) was a weak attack on Wesley, to which both Whitefield and Wesley made a satisfactory reply. Warburton's mental powers did not last out his life, and the loss of his only son in 1755 was a trial from which he never recovered. He died June 11, 1779, and was buried in his cathedral. His widow in 1781 married a former chaplain, John Smith.

Warburton in his early years had aided Theobald in his Shakespeare, and in 1747 he himself issued an edition which brought him no credit, for Douce was within the truth when he called him of all Shakespeare commentators 'surely the worst.' His chief remaining works were the credulous enough *Julian* (1750), on the renegade emperor's attempt to rebuild the temple at Jerusalem, *à propos* of Middleton's *Inquiry concerning the Miraculous Powers of the Early Church;* his edition of Pope (1751); *The Principles of Natural and Revealed Religion*, sermons (3 vols. 1753–54–67). A sumptuous edition of his works was published in 1788 by his jackal, Bishop Hurd, in seven quarto volumes, at the expense of his widow; a more recent edition is in 12 vols. (1811). —His name survives in the Lecture he founded at Lincoln's Inn with £500 in 1768.—See the Lives by F. Kilvert (1860) and J. S. Watson (1863), also Leslie Stephen in *Fortnightly Review* for February 1872, and in his *History of English Thought in the Eighteenth Century* (1876), Mark Pattison's *Essays* (vol. ii. 1889), and Sir J. F. Stephen's *Horæ Sabbaticæ* (vol. ii. 1892).

Ward. See GUARDIAN, CHANCERY.

Ward, ADOLPHUS WILLIAM, was born at Hampstead, December 2, 1837, and had his education in Germany, at Bury St Edmunds, and St Peter's College, Cambridge, becoming a fellow thereof in 1860. In 1866 he was appointed to the chair of History and English Literature at Owens College, Manchester, and became its Principal in December 1888. He received the degrees of LL.D. from Glasgow in 1879 and Litt.D. from Cambridge in 1883. He translated Curtius' *History of Greece* (5 vols. 1868–73), and wrote a profoundly learned and invaluable *History of English Dramatic Literature* (2 vols. 1875). Other works are *Chaucer* (1880) and *Dickens* (1882) in 'English Men of Letters,' the Globe edition of Pope's poetry (1869), and Marlowe's *Faustus*, together with Greene's *Friar Bacon* (1878), for the Clarendon Press.

Ward, ARTEMUS. See BROWNE (C. F.).

Ward, EDWARD MATTHEW, painter, was born in 1816 in London. In 1834 he was sent to study at the Royal Academy, and two years after he went to Rome. He returned to England in 1839 by Munich, where he had lessons in fresco-painting from Cornelius. In 1843 he competed unsuccessfully for the decoration of the Houses of Parliament. In the same year, however, he made a very 'palpable hit' by his 'Dr Johnson perusing the Manuscript of the *Vicar of Wakefield*.' In 1853 he was solicited by the Fine Arts Commissioners to aid in the work at Westminster. Of the eight pictures which he engaged to furnish two were done in oils and two in water-glass—one of them 'The Last Sleep of Argyll.' He became A.R.A. in 1847, and R.A. in 1855. A few of his more notable pictures are—'The Fall of Clarendon,' 'Interview between Charles II. and Nell Gwynn,' 'The Royal Family of France in the Prison of the Temple,' 'Charlotte Corday led to Execution,' 'Jeanie Deans,' 'The Earl of Leicester and Amy Robsart,' 'Luther's First Study of the Bible,' 'Baxter and Jeffreys,' 'Doctor Goldsmith,' and 'James II. receiving the News of the Landing of William of Orange.' He died from a wound inflicted by his own hand, 15th January 1879. See his *Life and Works*, by J. Dafforne (1879).

Ward, MRS HUMPHRY. Mary Augusta Arnold was born in 1851 at Hobart in Tasmania, eldest daughter of Thomas Arnold (b. 1823), second son of the great Dr Arnold of Rugby. Her father, becoming a Roman Catholic, resigned his place as inspector of schools, and returned to England in 1856 to become professor in the Roman Catholic university at Dublin. Afterwards in the Oratory School at Birmingham and at Oxford, he wrote a serviceable *Manual of English Literature* (1862), and edited *Select English Works of Wyclif* (3 vols. 1869), *Beowulf* (1876), and for the Rolls series Henry of Huntingdon (1879) and Symeon of Durham (1882–85). Together with the Rev. William E. Addis he edited the well-known *Catholic Dictionary* (1883). In 1872 Miss Arnold married Thomas Humphry Ward (b. 1845), the editor of *The English Poets* (4 vols. 1880–81), *Men of the Reign* (1885), *Men of the Time* (12th ed. 1887), and *The Reign of Queen Victoria* (1887). She began early to contribute to *Macmillan's Magazine*, and gave the fruits of her Spanish studies to Smith and Wace's *Dictionary of Christian Biography*. A child's story, *Milly and Olly* (1881), *Miss Bretherton* (1884), a slight

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but promising novel, and the translation of Amiel's *Journal Intime* (1885) prepared the way for the widely read spiritual romance of *Robert Elsmere* (1888). The book was an attempt to represent the struggle of a soul in its voyage towards newer theistic aspirations after losing the landmarks of the old faith. Profound spiritual insight, broad human sympathy, and strong thinking are manifest throughout, but as a work of art it is marred by diffuseness, its didactic persistency of purpose, and a fatal want of mastery over the fundamental secret of the novelist—the power to make his puppets live rather than preach. Its phenomenal success was due to the fact that it was a genuine product of an age of spiritual unrest, when men were everywhere looking for a sign. Its successor, *David Grieve* (1892), showed all its faults but hardly all its merits, and yet is said to have brought its author in the first two months no less than £18,000. Mrs Humphry Ward took a principal part in the establishment (1890) of University Hall, Gordon Square, as a centre for young men of humanitarian sympathies and more or less liberal religious thought.

Ward, NATHANIEL BAGSHAW (1791–1868), botanist and inventor of the 'Wardian Case' for the transport of delicate ferns and other such plants, or for keeping them indoors—a close glass case fitted accurately on a tray containing soil.

Warden, an officer appointed for the naval or military protection of some particular district of country. To keep the districts of England adjoining Scotland and Wales in a state of defence, Lords Wardens of the Marches were appointed. See BORDERS; also CINQUE PORTS, STANNARIES.

Wardlaw, ELIZABETH, LADY, Scottish poetess, was born in 1677, the second daughter of Sir Charles Halkett, Bart. of Pitfirrane. She married in 1696 Sir Henry Wardlaw, Bart. of Pitreavie, also near Dunfermline, and died in 1727. Her pseudo-archaic ballad, *Hardyknute, a Fragment*, was first published in 1719 as a genuine antique, and, expanded from 216 to 336 lines, had been two or three times reprinted, when Percy in the second edition of his *Reliques* revealed the secret of its authorship. To Lady Wardlaw also Dr Robert Chambers in 1859 ascribed 'Sir Patrick Spens,' 'The Douglas Tragedy,' and many more of our finest traditional ballads. Endorsed though it be by Professor Masson in his *Edinburgh Sketches* (1892), the theory is untenable; still our debt to Lady Wardlaw is a heavy one, for '*Hardyknute*,' says Scott, was 'the first poem I ever learnt, the last I shall ever forget.'

Wardlaw, RALPH, a great Scottish divine, was born at Dalkeith, 22d December 1779. A great-grandson of Ebenezer Erskine, he studied at the Selkirk theological hall of the Secession Church after his university course at Glasgow, but embraced Congregationalist views, and settled as pastor in Glasgow. In 1811 he was appointed professor of Theology to the Congregational body in Scotland, an office he retained along with his pastorate to his death, 17th December 1853. Wardlaw was a powerful preacher, a sound theologian, able and vigorous controversialist, and a voluminous writer. He took an active part in the anti-slavery agitation, and in the formation of the Evangelical Alliance (1846).

The most important of his works are *Discourses on the Socinian Controversy* (1814); *Lectures on Ecclesiastes* (1821); *Discourses on the Sabbath* (1832); *Christian Ethics* (1833); *National Church Established Examined* (1839); *Lectures on Female Prostitution in Glasgow* (1842); *Discourses on the Nature and Extent of the Atonement of Christ* (1843); *Congregational Independency* (1848); *On Miracles* (1852).—See the Memoir by Dr W. L. Alexander (1856).

Wardship, in English feudal law, was the guardianship which the feudal lord had of the land of his vassal while the latter was an infant or minor. Until the majority of the infant the lord, out of the profits, provided a fit person to render the services incumbent on the vassal. In the case of a female ward, he could dispose of her hand in marriage. See TENURE, FEUDALISM.

Ware, a market-town of Herts, on the Lea, 2½ miles ENE. of Hertford. It has a fine cruciform church, remains of a priory (1233), great malting establishments, and memories of Godwin and 'John Gilpin.' St Edmund's Catholic College (1769), with a chapel of 1850 by Pugin, is at Old Hall Green, 5 miles NNE.; and the great Bed (q.v.) of Ware was in 1869 removed to Rye House. Pop. (1851) 4882; (1891) 5121.

Ware, a town of Massachusetts, on Ware River, 74 miles by rail W. of Boston, with cotton and woollen factories, and a pop. of 7329.

Wareham, a small but very ancient market-town of Dorsetshire, stands between the rivers Piddle and Frome, 15 miles E. of Dorchester. It was a British town, and afterwards a Roman station, and is surrounded by a vallum or grassy earth-wall, which is still about 30 feet high, and is perfect on three sides. A fire destroyed two-thirds of it in 1762, and a Norman castle and a priory have disappeared; but St Mary's church retains an interesting chapel, that marks the resting-place for two years of Edward the Martyr. Superseded by Poole as a port, Wareham now depends chiefly on extensive clay-works. It is a municipal borough, and till 1832 returned two members, then till 1885 one (with Corfe Castle, Arne, &c.). Horace Walpole is claimed falsely as a native. Pop. 2141.

Warehousing. See BONDED WAREHOUSE.

Warham, WILLIAM, Archbishop of Canterbury from 1503 to 1532, was born about 1450 at Church Oakley in Hampshire, and was educated at Winchester and New College, Oxford. He took holy orders, but also practised law, and became advocate in the Court of Arches and moderator of the Civil Law School in St Edmund's parish, Oxford. He became known to Henry VII., and was attached to an embassy to the court of Burgundy. His services in connection with Perkin Warbeck's pretensions to the crown obtained for him rapid preferment in church and state, and he was soon Master of the Rolls (1494), Lord Chancellor (1503), Bishop of London (1503), and Primate (1503). He fell into disfavour with Henry VIII., and in 1515 resigned the great seal to Wolsey. He was a close friend and favourer of the New Learning and of its apostles in England—Erasmus, Dean Colet, Grocyn, and Linacre—but had no stomach for fundamental reform. He listened to the ravings of the Maid of Kent, but had no pity for heretics and translators of the Scriptures. With regard to the divorce he passively supported the king, and he agreed to recognise the king's supremacy. He died 22d August 1532. See vol. vi. of Hook's *Lives of the Archbishops* (1868).

Warkworth, a small seaport (pop. 700) in Northumberland, near the mouth of the Coquet, 7 miles SE. of Alnwick by rail. The castle, mostly ruinous, dates from the 12th century, and is often named in the history of the Percies (as in Shakespeare's *Henry IV.*). The Norman church has been restored. The Benedictine priory was founded in 1256, and the hermitage 'deep hewn within a craggy cliff,' and known from Bishop Percy's ballad, is about a mile above the castle. The place gives the Duke of Northumberland a baronial title, his eldest son's son being known as Lord Warkworth. The trade, chiefly in exporting coal, is mainly carried on at Amble, 1 mile SE. on the coast.

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Warming. Warm-blooded animals require for health a certain temperature of the body, variable only within certain limits. If the external temperature become too high, the temperature of the body is regulated by perspiration and respiration; if it become low the bodily activity is increased, and the temperature thus kept up. Under ordinary circumstances, however, man needs to protect himself against excessive cooling, in order that he may lead the comparatively quiescent life of civilisation; he needs houses and clothing. If this precaution be neglected his vitality sinks; and as the external temperature falls the death-rate rises, which shows that there is a certain amount either of neglect or inability, or both, to take the measures necessary to avoid undue cooling of the body. This undue cooling may be avoided in two ways—by extra clothing or by artificial heating of apartments. In southern Europe and in China the former is the plan resorted to; in countries where fuel is not scarce the latter plan, which is preferable, is adopted.

The objects of artificial heating are the temperature most congenial to the human constitution, pure air to breathe, and air not too warm or dry. If the body be kept sufficiently warm the air which we breathe may be fairly cool; and an ideal system of warming would warm the body and leave the air cool and pure. The actual methods of warming are, to a greater or less extent, compromises, and they depend mainly either upon radiation of heat or upon convection of heat, or both. The former method is that of the open fire; the latter is, in the main, that of stoves, gas, steam, and hot water. In the former the walls and furniture of the room are warmed, while the air is not warmed directly by the fire, for the radiant heat streams through it without warming it; in the latter the air itself is warmed directly. In the former the walls are, so far as the fire is concerned, warmer than the air; in the latter the reverse is the case. In the former (the open fire) there is no tendency to deposition of moisture from the air upon the walls, unless the air becomes laden with excess of moisture from extraneous causes, such as the presence of a numerous assemblage, or unless the air becomes chilled and deposits its moisture even upon somewhat warmer walls; in the latter case, the walls being cooler than the air, there is a continuous tendency to the deposition of moisture on the walls, unless the air is at some distance from its saturation point. Heating by radiation is best exemplified by the open fire with a chimney or in the open air. The drawbacks of the open fire burning in a grate are the waste of fuel through imperfect combustion, the production of smoke, the comparatively small radiative power of flame (a blazing fire having less effect than a glowing one), the warming of surrounding objects on one side only, the want of an equably maintained temperature, and the waste of heat, which escapes with the smoke and chimney-gases. Its advantages are the satisfaction of the eye, cool air to breathe, and the ventilation produced. Smoke may be diminished and radiation increased by an extended use of coke; but coke does not do well if the fire burns low, and a blower should be used to make the fire draw quickly and become bright. A forced draught should always be used for a few minutes while lighting a fire; the amount of smoke produced is very materially diminished by this means. The forced draught is secured by narrowing the front aperture so that all the air which reaches the chimney must have passed through the fuel. If the aperture in front of the fire be large, air passes up to the chimney in front of the fire-gases, and the combustion is relatively slow. Dr Arnott (q.v.) developed the principle of limiting the access of air to the fuel by enclosing a store of fuel in an iron box beneath the grate, and bringing this gradually to the top by pushing up a false bottom; the air got access to the fire only at and near the top, and if the fire were left to itself it smouldered for many hours, ready to brighten up when it was pushed up so that air might gain freer access to it. In tending a fire it ought to be borne in mind that when the fire cannot radiate light it cannot radiate heat, and that it is therefore absurd to hide the fire under opaque masses of coal; and secondly, that the products of distillation of coal ought not to be allowed to escape as black smoke, but should pass up through a bright portion of the fire, and be perfectly burned. In special hearths it is possible, by means of false bottoms, to introduce fresh charges of coal underneath the existing fire so that the outer surface of the fire is always clear and bright. Even in ordinary grates it is possible to do a good deal towards minimising smoke and confining the active portion of the fire to the top and front; if, for example, a tile be fitted in the bottom of the grate; if a substantial amount of fuel be put in the grate and lit at the top; if this fuel contain some broken coke or cinder; if fresh fuel be added, not by throwing it on the top, but by raking the fire forward, throwing the fresh fuel into the hollow thus produced at the back of the fire, and then pushing the bright fire back upon it; if these things be done the fire is obviously brighter and more continuously cheerful and more nearly smokeless. The fire should always be bounded by fire-brick behind and on each side, for iron chills and blackens it. The fire-gases should not be allowed to escape at once into the chimney up a sloping iron back; but the back of the grate should be fire-brick all the way up, and should overhang the fire so that the ascending fire-gases impinge on it; by this means the 'throat' of the chimney is prevented from being excessively wide, the back-brick absorbs heat from the fire-gases and radiates it towards the floor, and the back-brick also reflects towards the room the heat radiated upwards from the top of the fire. For similar reasons the regulator or register should slope forwards. In every case, however, where there is flame there is great loss of heat, which escapes up the chimney, and even where the fire is smokeless this loss is considerable. The heat which is radiated into the apartment is never more than a fraction of the total heat of combustion of the fuel; and plans have been devised (see VENTILATION) for recovering some of this heat by causing it to warm the air which is supplied to the apartment.

In the more primitive plans in which there is no ventilation—an open fire in a cave, a tent, a wigwam, or a cabin, or a charcoal brazier in a room with a chimney, or a gas or petroleum stove isolated in a room—the whole heat of combustion of the fuel may be utilised in warming the walls and air of the room; but the products of combustion vitiate the air. Warming of this kind is effected by gas-burners and petroleum-lamps, which raise the temperature very considerably in non-ventilated rooms, but seriously vitiate the air at the same time.

By the use of close stoves the actual vitiation of the air by products of combustion is in great part avoided. The Dutch stove, for example, is a hollow cylinder or other form of iron, standing on a stone slab on the floor, close at the top, and having bars at the bottom on which the fire rests. The door by which the coals are put in being kept shut, the air for combustion enters below the grate; and a pipe issuing from near the top carries the smoke into a flue in the wall. If this pipe be made long enough the fire-gases traversing it may be very materially cooled down before they enter

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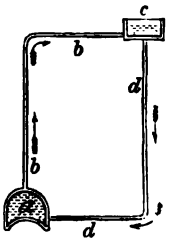
the chimney, and thus the bulk of the heat of combustion remains in the room. As far as mere temperature is concerned, this is a most effective and economical warming arrangement; but it has serious faults. The iron often becomes red-hot or even hotter; any carbonic oxide existing inside as the result of an inadequate draught passes through hot iron and acts as a slow poison, causing anæmia; the dust in the air is charred when it approaches the hot metal, and gives rise to offensive and unwholesome odours; the air is rendered very 'dry' by being strongly heated. These faults are more or less obviated by increasing the mass and the cooling surface of the stove so that it cannot become too hot externally when a moderate fire is kept up within; by regulating the fire; by adjusting the fire-capacity of the stove itself; by allowing the access of sufficient air to ensure complete combustion; by surrounding the fire with brick instead of iron, or building the whole stove of brick or earthenware; and by placing a vessel of water upon the stove, the water evaporated from which may supply the moisture necessary to bring the air to a congenial degree of saturation, appropriate to its new temperature. If this vessel of water be placed upon the stove the air takes up moisture from the evaporating pan, and does not then parch the skin and lungs; but when the room cools down again the air may readily prove supersaturated, and deposit moisture on the walls, a condition favourable to mould.

In most continental stoves the fire is surrounded by a mass of brick, lined externally with porcelain. The smoke goes along a winding passage in the structure and issues nearly cold. The brickwork becomes warmed, and keeps up a moderate heat for a long time after the fuel has burned out. Open-fire stoves have also been devised; and an open fire-grate might be built out into a room at a distance from the wall, and the flue might go at once into the chimney, or go up an ornamental column through the room above. By such means the waste heat of the chimney would be utilised in warming the air of the apartments.

Gas-stoves have come into considerable vogue of late years. They depend either upon radiation from luminous flames or from asbestos heated by Bunsen Burners (q.v.), or upon heating of a metal casing by Bunsen burners with or without direct contact between flame and casing. Bunsen flames are in themselves of no use for pure radiation, and bare flames without ventilation simply heat the air by pouring hot water-vapour and carbonic acid into it, as any other fuel would do. In gas-stoves as much as in open fires the products of combustion, though they are invisible, must be taken out of the room, and the means of access of these products to the chimney must be ample. The air of apartments is also frequently warmed by steam or hot-water pipes: these are iron pipes containing hot steam or hot water, and warm externally by reason of the heat-conductivity of the metal. Air coming in contact with them is warmed and ascends, its place being taken by cooler and heavier air, which in its turn ascends. The whole air thus becomes warmed. Radiation from the pipes is also favoured by a coat of paint, not by a smooth metallic surface. These systems lend themselves readily to distribution of heat throughout a building from one central fireplace. The pipes can be so arranged that the steam or water can be shut off from any part at will; and the tubes may, by being connected with or attached to plates or wings of metal, have their heating surface and their heating efficiency increased. Steam heating is useful where there is waste steam available, as in factories and railway trains. As long as steam goes on condensing it remains at 212° F. (100° C.) until it is wholly converted into water at 212° F.; overheating is thus not possible unless the steam is itself superheated at a high pressure. The pipes must be so laid, in the case of a building, that all condensed water may flow back into the boiler, and allowance must be made for expansion of the pipes by heat. When hot water is employed it may be made to circulate either at low pressure or at high pressure.

In low-pressure systems the arrangement may be illustrated by the figure, in which *a* is a boiler; *b* is a tube which circulates through the building; *c* is a small tank at the top of the circuit and open to the air, by which the tubes and boiler are kept full; *d* is the return tube. When the boiler is heated the heaviest portion of the water within the system, the cool water in *d*, tends to sink by gravity to the lowest level, and thus circulation is immediately set up, and kept up as long as the boiler maintains a difference of temperature. The portion of the pipe which contains the coldest water should be vertical, and the comparative coolness of the water in the return pipes is maintained by the loss of heat experienced by the water on its way round the building. In high-pressure systems the pipe is narrower and very strong (wrought-iron of special make and thickness), and it forms a closed endless coil throughout the building. It is completely filled with water, except at the top, where there is a strong closed cylinder (the 'expansion-pipe') containing air to provide for the expansion of the water by heat. The pipe is led in a 'boiler coil' round a fire at the basement. The water circulates for the same reason as in the low-pressure system, but it travels very rapidly, since the water can be heated in the boiler coil to temperatures far exceeding 212° F. This is because the whole apparatus is equivalent to a closed vessel, capable of standing great pressures, and in such a vessel water may be highly heated without attaining a boiling-point. The apparatus is tested for pressures of 2000 to 3000 lb. per square inch, and at 750 lb. pressure it would be possible to heat the water to 510° F. The usual heat employed is from 300° to 350° F., which corresponds to a pressure of from five to nine atmospheres.



The advantages of the high-pressure system are the use of smaller pipes, which are more convenient and more seemly; the possibility of making them dip without risk of the bends being blocked by air (the removal of which must, on the low-pressure system, be provided for and attended to); the ease of application of radiating surfaces to the smaller tubes; the yielding of the system by alternate compression and release of the air in the expansion-tube, which acts as an elastic cushion and tends to prevent fracture; the small quantity of water used, the rapidity of circulation and the consequent promptness of action; the freedom from any access of dirt to clog the tubes; and the advantageous form of the boiler-coil as a rapid heater. The disadvantages are the quick cooling down when the fire goes down and the want of uniformity of temperature when the fire fluctuates, the uncomfortable heat of the pipes when touched, the fact that the pipes must be kept at a greater distance from plants, the slight charring of dust in the air, the slight charring of some kinds of wood laid too near the pipes, and the greater chance of freezing if the fire goes out. For the last reason the pipes should be charged not with water but with a non-freezing solution. In a modification of the system

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specially applicable to cases in which portions of the system are to be shut off from time to time, there are outlet and inlet safety valves to let hot water out or cold water in when the pressures are greater or less than certain limiting values. In that case the expansion-pipe is often dispensed with. In these cases the air which is in the room is heated. The heating of air to be brought into a room will be found under VENTILATION.

Small spaces may sometimes be warmed by the introduction of hot water, as railway carriages by hot-water tins. Better than hot water is a tin case filled with crystallised acetate of soda; this is exposed to heat until it becomes warm; the heat absorbed is partly expended in melting the acetate, which then dissolves in its own water of crystallisation; the mass therefore absorbs much heat; and as it cools down it keeps on liberating its latent heat for a protracted period.

As to conserving the warmth of a room by preventing heat from escaping, the leading methods are to make the walls, doors, &c. bad conductors and air-tight. Air-tightness is incompatible with ventilation, but bad conduction is desirable both in winter and summer. The best material for a badly-conducting wall is one of a porous or spongy texture, such as porous stone or brick, which contains air in its interstices; but the best structural form is that which contains a film or jacket of air. Even iron houses may be made warm in winter by this means, if plaster-lined. Windows, again, if made double—double panes or, better, double sashes—allow very much less heat to escape than single ones, and even window-blinds and curtains have to a smaller extent the same action. The intervening air-film or layer is prevented from flowing away, and it is a very bad conductor.

See Edwards on *Ventilation and Heat* (Longmans, 1881), and Dye's edition of C. Hood's *Warming Buildings* (1891), and literature there cited. See also FUEL.

Warminster, an ancient market-town of Wiltshire, on the west border of Salisbury Plain, and 19½ miles NW. of Salisbury. It has a town-hall (1831); a free school (1707), at which Bishop Hampden and Dr Arnold were pupils; and a theological college (1860). The Marquis of Bath's seat, Longleat, 4½ miles SW., is one of the noblest Elizabethan mansions in the kingdom, with a fine collection of portraits, memories of Bishop Ken, and a magnificent park. Pop. (1851) 6285; (1891) 5562. See J. T. Daniell's *History of Warminster* (1879).

Warneck, GUSTAV, theologian, was born at Naumburg in Germany, March 6, 1834, studied at Halle, and became pastor at Rothenschirmbach near Eisleben (1874). Editor of a *Missions-Zeitschrift*, he has written many books and papers on missions, those translated into English being *Modern Missions and Culture* (1883) and *Outline of the History of Protestant Missions* (1884).

Warner, CHARLES DUDLEY, American author, was born at Plainfield, Massachusetts, 12th September 1829, graduated in 1851 at Hamilton, and in law at the University of Pennsylvania in 1856, practised in Chicago till 1860, and then settled as an editor at Hartford. In 1884 he became co-editor of *Harper's Magazine*, to which his papers on the South, on Mexico, and the Great West have been contributed. In 1873 he wrote with Samuel L. Clemens ('Mark Twain') *The Gilded Age;* before that he had published *My Summer in a Garden* (1870) and *Back-log Studies* (1872). Other works are *Being a Boy* (1877), *Washington Irving* in his 'Men of Letters' series (1881), various books of travel, &c.

Warner, SUSAN, authoress, born at New York, 11th July 1819, published under the pen-name of Elizabeth Wetherell her first novel, *The Wide, Wide World*, in 1851. It proved, next to *Uncle Tom's Cabin*, the most successful of American stories, and owes nothing to either its subject or its incidents. *Queechy* followed the year after, *The Hills of Shatemuc* in 1856, *The Old Helmet* in 1863, *Melbourne House* in 1864, *Daisy* in 1868, and *A Story of Small Beginnings* in 1872. Her other works were mostly religious. She died at Highland Falls, New York, 17th March 1885.

War Office. See WAR.

Warping, a method of improving land by distributing on it, by embankments, canals, flood-gates, &c., the alluvial mud brought down by rivers.

Warrant, an authorisation from the proper authority to a person to do something which he has not otherwise a right to do. The more formal warrants are under the hand and seal of the person granting them. The kinds of warrants are innumerable—informal instruments authorising a person to receive money or goods, such as dock-warrants, dividend-warrants, share-warrants, and formal legal warrants used in civil and criminal cases. Warrant of attorney is dealt with at ATTORNEY. The more important judicial warrants are the bailiff's-warrant, the sheriff's authorisation to a bailiff to execute a writ; the warrant to answer, issued by a justice of the peace, for the apprehension of a person accused of an indictable offence; the bench-warrant, issued by the court before which an indictment has been found, to arrest the accused; and the warrant of deliverance, for discharging from prison a person who has been bailed. General warrants, issued against no one person named, but against all persons suspected, were formerly in use, and proved an instrument of oppression; in the case of Wilkes, such a general warrant issued by a secretary of state to search for and seize the papers of the author (not named) of a seditious libel was decided to be illegal. In Scotland, after the declaration of an accused person has been made, if there be reasonable grounds of suspicion against him, the magistrate grants a warrant, the warrant of commitment, sending him to prison to abide the result of his trial. By statute 1701, chap. 6, this warrant must be in writing and duly signed; it must specify the particular offence charged, and must proceed on a signed information. There are, further, the distress-warrant, issued for raising a sum of money upon the goods of a party specified in the warrant; and the search-warrant, granted by a justice of the peace to a constable to enter the premises of a person suspected of secreting stolen goods, or of keeping gunpowder, nitro-glycerine, liquors, &c. contrary to law. Contrary to a common impression, no special warrant is required for capital punishment, the so-called death-warrant being simply the calendar of the prisoners' names, with their punishments on the margin, signed by the judge. In the United States warrants must not issue save on probable cause, supported by oath or affirmation, describing the person to be arrested or the place to be searched.

Warrant-officers. The highest ranks to which seamen under ordinary circumstances can attain are those of warrant-officers and chief warrant-officers. They are divided into three classes—gunners, boatswains, and carpenters, the gunners taking precedence of the other two. Of late years their pay and position have been greatly improved, while their sphere of duties has been much enlarged. They now rise from 5s. 6d. per diem, when they first receive their warrant, to 7s. 6d. per diem, and to 9s. on promotion to chief warrant-officer, exclusive of any extra allowances to which they may be entitled for performing special duties. Formerly, before ironclads superseded wooden ships, there was only one officer of this rank of each

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class carried on board even the largest ships. Now, in addition to the officer of each class appointed to carry out the special duties of gunner, boatswain, and carpenter on board every ship, there are usually three or four junior gunners or boatswains appointed to battle-ships and some of the larger of other classes of ships to perform what are called quarter-deck duties, in addition to which in many of the larger ships an extra gunner or boatswain is appointed for torpedo-duties. A certain proportion of these officers who have duly qualified in navigation are now appointed to command torpedo boats, and in war-time they will unquestionably be largely employed on that service. The warrant-officers of the present day are for their station a most highly educated and most efficient body of men. On the occasion of the Queen's jubilee in 1887 two of this rank were promoted to lieutenants for distinguished service before the enemy during the Egyptian war of 1882–85; and a limited number of the chief warrant-officers who have a specially good record of service are also allowed on retirement to assume that rank. Warrant-officers rank with, but before, midshipmen and with second-lieutenants in the army; chief warrant-officers with, but after, sub-lieutenants in the navy and lieutenants in the army; they can rise to a maximum pension of £150 a year, and their widows are also entitled to a small pension. For Warrant officers in the army, see NON-COMMISSIONED OFFICERS.

Warranty, in English law, is a promise to secure a person in the enjoyment of a right transferred to him. According to ancient rules of procedure, a person whose title was questioned might vouch another to warranty—i.e. call upon him to make good the guarantee he had given; the vouchee on his appearance stepped into the place of the original defendant. As applied to land the term is now obsolete, but in the mercantile law warranties are still of great importance. On a contract of sale, e.g., the general rule is *caveat emptor*—let the buyer look to himself: a person who sells a thing in its natural state, having no better means of information than the purchaser, is not taken to warrant the quality of the article; he is not liable to make good any defects unless he has been guilty of fraud or dishonest concealment. But where the purchaser has to rely on the vendor the law will generally imply a warranty. Thus, a person selling goods for a particular purpose is usually taken to warrant that they are suitable for that purpose; a dealer in provisions, for instance, warrants them to be wholesome and fit for food. If the goods are unsuitable, it sometimes happens that the purchaser has two courses open to him: he may reject the goods as not corresponding to the contract, or he may accept the goods and sue the vendor for damages for breach of warranty. On a sale by a manufacturer, he is taken to warrant that the goods are of his own manufacture, unless the usage of trade is to the contrary; on a sale by sample there is an implied warranty that the bulk corresponds to the sample in quality and condition. A seller is held to warrant his right to sell; if he is not in fact the owner of what he sells he may have to pay damages if the true owner claims the property from the purchaser; but a seller with a doubtful title may protect himself by agreeing to transfer such rights as he has. The rule of law is sometimes expressed by saying that a seller is not liable in respect of patent defects (i.e. such as the buyer might discover by the exercise of his own judgment), but only for latent defects (i.e. defects known to the vendor which the purchaser has no means of discovering). A warranty must of course be carefully distinguished from a mere expression of opinion about the thing sold. An agent or servant has no right to give a warranty unless he is authorised to do so. On the sale of a horse, the purchaser must make proper inquiry and investigation; if the horse turns out restive or unmanageable, he cannot recover damages unless the seller has given him an express warranty to the contrary.

Unsoundness in horses is a relative term, and difficult to define; but the rule is that, if at the time of sale the horse has any disease which either actually does diminish its natural usefulness so as to make it less capable of performing the work it is intended for, or which in an ordinary course may hereafter diminish its usefulness, or if either from disease or accident it has undergone any alteration of structure that either actually at the time does, or may in its ordinary course, diminish the animal's usefulness, such a horse is unsound. Veterinarians of experience recognise two conditions under the term *sound*, and two converse ones under that of *unsoundness*. The first is recognised under the appellation of 'legally sound,' and is thus defined by Baron Parke. 'I think the word sound means what it expresses—viz. that the animal is *sound* and free from disease at the time he is warranted.' Now experience is opposed to this, as many, perhaps the majority, of horses have evidence of disease or of the results or products of disease or accident in some part or parts of the body; or they may have some infirmity, such as being slight 'roarers' or whistlers, or have slight stringhalt, which renders them legally unsound. Such horses if warranted sound are returnable; but they may nevertheless be what is termed serviceably sound—that is to say, fit to perform the work for which they are bought. Or again, a horse may have a bone spavin; now a bone spavin is looked upon as a disease, and a spavined horse is considered unsound. But if he is free from lameness and have good hock action, in the opinion of many veterinarians he is serviceably sound. And pathological investigation has confirmed this view, for it has discovered that the enlargement—the bone spavin or exostosis—is composed of reparative material, by which the actual disease has been cured. Then again there are what are denominated 'hereditary unsoundnesses,' and the following are officially recognised by the R.A.S.E.: roaring and whistling, bone and bog spavins, side-bones and ring-bones, stringhalt, cataract, and navicular disease.

See Anson, *Law of Contract;* Chalmers, *Sale of Goods;* Oliphant, *Law of Horses;* and Ross Stewart, *Law of Horses* (1892). Guaranty (q.v.), etymologically the same word as warranty, has a different sense in law.

Warren is a place kept for the purpose of breeding game or rabbits. In its strict legal sense a right of free warren (extending to hares, rabbits, partridges, pheasants, and sometimes quails, woodcocks, and water-fowl) can only be derived by grant from the crown, and gives certain privileges to the warrener as to recovering game and destroying dogs which infest it.

Warren, (1) capital of Trumbull county, Ohio, 52 miles by rail SE. of Cleveland, with rolling and flour mills, and manufactories of linseed-oil, cottons, &c. Pop. 5973.—(2) Capital of Warren county, Pennsylvania, on the Alleghany River, 66 miles by rail SE. of Erie. It manufactures engines and boilers, wooden wares, and leather, and has a trade in lumber and petroleum. Pop. 5288.

Warren, SAMUEL, novelist, was born in Denbighshire, 23d May 1807. He studied medicine at Edinburgh and law at the Inner Temple, and was called to the bar in 1837. He was made a Queen's Counsel (1851), was Recorder of Hull (1854–74), represented Midhurst in the Conservative interest

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(1856–59), and then he was appointed one of the two Masters of Lunacy. His *Passages from the Diary of a Late Physician* (1832) had been contributed to *Blackwood's Magazine*, as also was *Ten Thousand a Year* (1841), the amusing story of 'Tittlebat Titmouse.' By these he is chiefly remembered; but he published a dozen more works, including *Now and Then* (1847), *The Lily and the Bee* (1851), and several law-books. He died in London, 29th July 1877.

Warrington, a municipal and parliamentary borough and manufacturing town of Lancashire, on the right bank of the Mersey, 18 miles E. of Liverpool, 16 WSW. of Manchester, and 182 NW. of London. Though of recent development, it is an ancient place, the *Wallintun* of Domesday; and, acquiring strategic importance through its bridge (1496) over the Mersey, it was the scene of defeats of the Scots (1648), the royalists (1651), and a portion of Prince Charles Edward's forces (1745). To a dissenting academy, founded in 1757, it owes its memories of Drs Aikin, Priestley, Taylor, &c.; and Lucy Aikin was a native. There are still some old timbered houses; and the parish church, St Elphin's, with a spire 300 feet high, is a fine cruciform Decorated structure, restored in 1859–67 at a cost of over £15,000. The town-hall was the former seat (1750) of Col. Wilson Patten, purchased in 1872 for £20,000; and other buildings are the Royal Court Theatre (1862), post-office (1876), hospital (1876), museum and library (1857), school of art (1882), public baths (1866), grammar-school (1526; rebuilt 1857), &c. There are also public gardens and a park. The manufactures include iron, wire, pins, files, cottons, glass, leather, and soap. Warrington was constituted a parliamentary borough, returning one member, in 1832, and a municipal borough in 1847. Pop. (1851) 22,894; (1881) 45,253; (1891) 55,349, of whom 52,742 were within the municipal boundary.

See a monograph on the worthies of Warrington by James Kendrick (1853), and others by William Beamont (Chetham Society, 1872–73) on an Augustinian friary founded in 1379, on the lords of Warrington, &c.

Warsaw (Polish *Warszawa*), long the capital of Poland and now capital of a government of Russian Poland, stands on the left bank of the Vistula, 330 miles E. of Berlin by rail and 700 SW. of St Petersburg. It stands partly on a high plain, partly on the terraces sloping upwards from the left bank of the river, extends over a wide area, and consists of the city proper and a number of suburbs. Two iron bridges connect Warsaw with the suburb of Praga, on the right bank of the Vistula. Standing on a navigable river, with great railway lines to Moscow, St Petersburg, Vienna, Danzig, and Berlin, Warsaw is one of the most important in eastern Europe, being, next after Moscow and St Petersburg, the largest city in the empire. There is much trade in corn and flax exported, and in coal and manufactured goods imported. Warsaw has among its own manufactures those of electroplate, machinery, boots and leather goods, woollens, pianos, carriages, tobacco, sugar, chemicals, beer, and spirits. Of over one hundred Catholic churches the cathedral of St John is the most notable; there are also some half-dozen Greek churches, two Lutheran ones, and many synagogues. The castle is an imposing building, and contains many pictures and sculptures. There are innumerable private palaces or mansions, many of them fine. The university, suppressed in 1832, was reopened in 1864, and has seventy-five professors (who teach in Russian) and about 1000 students. There are various academies and museums, a school of arts, several theatres, and some fine public gardens. Pop. (1872) 276,000; (1891) 465,272. Area of government, 5623 sq. m.; pop. 1,465,131. The city of Warsaw has been closely identified historically with Poland, the insurrections against Russia having generally had their headquarters here. See POLAND, RUSSIA.

Wart. See WARTS.

Wartburg. See EISENACH.

Warthe, the Oder's chief affluent, rises on the south-west frontier of Poland, flows north and west into Prussia, then north (past Posen) and west again, and enters the Oder at Küstrin. Length, 445 miles (230 in Prussia, and 265 navigable).

Wart-hog (*Phacochœrus*), a genus of Suidæ, closely resembling the true hogs in most of their characters, and particularly in their feet, but remarkably differing from them in their dentition: the number of teeth is much reduced; the canines become the large tusks, and in the adult the last molar only is found in each jaw, which grows to an enormous size as in the elephant. The head is very large, and the muzzle very broad; the cheeks are furnished with large wart-like excrescences, so that the appearance is altogether very remarkable and uncouth. The species are all natives of Africa. They feed very much on the roots of plants, which they dig up by means of their enormous tusks. The African Wart-hog, or Haruja (*P. æliani*), a native of Abyssinia and of the central regions of Africa, from the coast of Guinea to that of Mozambique, is nearly 4 feet long, with a naked slender tail of 1 foot, is scantily covered with long bristles of a light-brown colour, and has a mane sometimes 10 inches long, extending from between the ears

Wart-hog (*Phacochœrus æthiopicus*).

along the neck and back. Another species is found in the south of Africa (*P. æthiopicus*), the *Valke Vark* of the Dutch colonists at the Cape of Good Hope. The incisors of the latter fall out at an early age, those of the former are persistent. A closely allied genus is Potamochœrus, of which there are several species, as the *Bosch Vark* of Cape Colony (*P. africanus*), which is nearly black, with whitish cheeks having a central black spot, and the Painted Pig of West Africa (*P. penicillatus*), which is reddish, with black face, forehead, and ears; another and less known species is *P. edwardsi* from Madagascar. The species of Potamochœrus frequent swampy grounds, and sometimes receive the name of Water-hog. They have longer ears than the true wart-hogs, tapering and ending in a pencil of hairs; the face is elongated, and has a huge protuberance on each side. The flesh of all the wart-hogs and water-hogs is in high esteem. They are hunted by dogs, which are often killed in the encounter with them. They are much addicted to fighting among themselves. This genus differs from Sus in that there are only four young in a litter, and that one molar tooth in each jaw has disappeared.

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Warton, JOSEPH, was born at Dunsfold, Surrey, in 1722, son of the Rev. Thomas Warton (1688–1745), vicar of Basingstoke in Hampshire, and sometime professor of Poetry at Oxford. At fourteen he was sent to Winchester, whence in 1740 he passed to Oriel College, Oxford. In 1748 he was presented to the rectory of Winslade near Basingstoke, was appointed second master of Winchester in 1755, and was its head-master from 1766 till his retirement in 1793. His preferments were a prebend of St Paul's, the living of Thorley, Hertfordshire, a prebend of Winchester, and the rectory of Easton, which he soon after exchanged for that of Upham. His *Odes* (1746) marked a reaction against the dominant school of Pope. An edition of Virgil (1753), with translation of the *Eclogues* and *Georgics*, gained him a high reputation. He was much esteemed by Dr Johnson, and, like his brother Thomas, was one of the members of the famous Literary Club. In 1756 appeared the first volume of his *Essay on the Writings and Genius of Pope*, the second and concluding volume following only in 1782. The distinction it drew between the poetry of reason and the poetry of fancy marked an important point in English criticism. His latest works were an annotated edition of Pope (9 vols. 1797) and a similar edition of Dryden, of which he had published two volumes at his death, in London, 23d February 1800. See the *Memoir* by the Rev. John Wooll, a ridiculously stilted panegyric (1806).—THOMAS WARTON, his brother, was born in 1728 at his father's vicarage of Basingstoke. In 1743 he was entered at Trinity College, Oxford, where he obtained a fellowship in 1751. He remained at the university as a tutor, and in 1757 was appointed professor of Poetry. In 1767 he took his B.D. degree, and was soon after presented to the living of Kiddington, to which he added in 1782 the college living of Hill Farrance in Somersetshire. But he had more taste for the pipe and tankard than clerical duty, and we are told how he mostly confined himself in preaching to two sermons—one his father's, the other a printed one, and even that abridged. His *Observations on the Faerie Queene of Spenser* (1754; 2d ed. expanded to 2 vols. 1762) established his reputation as a critic. But the work by which Thomas Warton will be ever remembered is his *History of English Poetry* (1774–78–81; ed. in 4 vols. by W. C. Hazlitt, 1871), which, in the width of its learning, remains to this day unrivalled. As a poet Warton takes distinct if hardly high rank. In 1777 he published a collection, and on the death of Whitehead, the poet-laureate, he had the honour, such as it was, of succeeding him in the office. That same year he was elected Camden professor of History at Oxford. His last work was an elaborately annotated edition of the Minor Poems of Milton (1785). He died suddenly, 21st May 1790. His miscellaneous writings included humorous and burlesque poetry and prose, genial satires on Oxford, an edition of Theocritus, lives of Thomas Pope and Bathurst, two Trinity College benefactors, *Inquiry into the authenticity of the Rowley Poems*, &c. See the Life in Mant's edition of his poems (1802); and John Dennis, *Studies in English Literature* (1876).

Warts (sometimes known in Surgery by their Latin name *Verrucæ*) are collections of lengthened papillæ of the Skin (q.v.), closely adherent and ensheathed by a thick covering of hard dry cuticle. From friction and exposure to the air their surface presents a horny texture, and is rounded off into a small button-like shape. Such is the description of the simple wart, which is so commonly seen on the hands and fingers (and rarely on the face or elsewhere) of persons of all ages, but especially of children. Amongst other varieties of warts are (1) one to which the term *Verruca digitata* has been applied. It is more elongated in shape, and less protected by cuticle than the preceding. It is said to occur nowhere but on the scalp of women of adult age, and sometimes to occasion great annoyance in brushing and combing the hair. (2) *Subungual warts*, growing, as their specific name implies, beneath or at the side of the finger or toe nails. They originate beneath the nail, and as they increase they crop out either at the free extremity or the side of the nail, and are usually troublesome, and often very painful. They are generally of syphilitic origin. (3) *Venereal warts*, caused by the direct irritation of the discharges of gonorrhœa or syphilis, and occurring about the parts which are liable to be polluted with such discharges. They attain a larger size, and are more fleshy and vascular than other warts.

Nothing is known of the causes of warts further than that the third variety is induced by an irritating discharge, that the malignant form of wart which is the beginning of chimney-sweepers' cancer is caused by the irritation of soot, and that persons engaged in dissection and *post-mortem* researches are especially liable to them; hence we may infer that they are always due to some local irritation. Venereal warts are certainly contagious; with regard to others, we cannot speak positively. According to popular belief, blood from a wart is capable of producing similar warts when applied to the skin, and occasionally, but rarely, this has been the case in the experience of surgeons. In consequence of the capricious way in which warts often undergo spontaneous cure, there are numerous popular charms for their removal, several of which may be found recorded in the pages of *Notes and Queries*. Common warts are so apt to disappear that they may be often left to themselves. If it is desired to remove them, glacial acetic acid may be applied with a camel-hair pencil till the wart is pretty well sodden, care being taken not to blister the neighbouring skin. One or at most two applications are usually sufficient. Nitrate of silver and tincture of iron are popular and general applications. Salicylic acid in collodion (see CORNS) is also very effective. Small warts hanging by a neck may often be very simply removed by the tight application of an elastic ligature (e.g. a small broken elastic ring) to the base. The wart usually shrivels up and falls off within a week. The other varieties of warts must be left to the surgeon.

Warwick, the county town of Warwickshire, on the Avon, 21 miles SE. of Birmingham, 45 NNW. of Oxford, and 107 NW. of London. In spite of a great fire in 1694, it has preserved much of its mediæval character, and, besides a good deal of antique domestic architecture, retains two of the old gates with chapels above their archways. St Mary's church is a large cruciform Perpendicular structure, partly rebuilt after that great fire, with a Norman crypt, the superb Beauchamp chapel (1464), and a wealth of interesting monuments. But Warwick's chief glory is its stately castle, on a rocky elevation, 40 feet high, overhanging the river. Ethelfleda, King Alfred's daughter, built a fortress here about 915; but the present edifice, which extends over 3 acres, is all of post-Conquest erection, its oldest portion the huge Cæsar's Tower (147 feet high), whilst Guy's Tower (128 feet) was built in 1394. Having passed ere then, with the earldom of Warwick, to the Beauchamps, Nevilles, Plantagenets, Dudleys, and Riches, it had long been ruinous when in 1605 it was granted to Sir Fulke Greville (q.v.), whose descendant, Lord Brooke, was in 1759 created Earl of Warwick, and who spent at least £20,000 in repairing and beautifying it. It stood a memorable siege by the royalists during the Great Rebellion, and its great

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hall was gutted by fire on 3d December 1871; but by 1876 the damage had been repaired at a cost of £18,000, and Warwick Castle is one of the few feudal residences still tenanted. Besides relics of Guy of Warwick (q.v.), the 'King-maker,' and Cromwell, it has paintings by Van Dyck, Rubens, Holbein, and other masters, the 'Grimani table,' valued at £10,000, and the Greek 'Warwick vase,' 7 feet in diameter, from Hadrian's Villa at Tivoli. It has welcomed many royal visitors, as Queen Elizabeth, James I., William III., and (in 1892) the Prince of Wales and the Duke of York. The Leycester Hospital was founded in 1571 by Robert Dudley, Queen Elizabeth's favourite, for twelve poor brethren; the king's school (1546), which has a yearly endowment of £800, occupies fine modern buildings erected at a cost of over £13,000. The industries include the making of art furniture, gelatine, and agricultural implements; and there is a considerable trade in agricultural produce. Warwick, which was chartered by Henry VIII. as a municipal borough, lost one of its two members in 1885, when the parliamentary boundary was extended so as to take in Leamington (q.v.), the borough being called that of Warwick and Leamington. Pop. of mun. borough (1851) 10,973; (1891) 11,905; of parl. borough (1891) 39,102.

Warwick, a township of Rhode Island, on Narragansett Bay, 10 miles SW. of Providence, the birthplace of General N. Greene. Pop. 17,761.

Warwick, RICHARD NEVILLE, EARL OF, the King-maker, eldest son of Richard, Earl of Salisbury and Alice Montacute, was born November 22, 1428. The house of Neville had been built up by a series of wealthy marriages, and Richard was no exception to the rule. While yet a boy he was married to Anne, daughter of the Earl of Warwick, and through her, after the death of her brother and niece, he took his place at the age of twenty-one among the chief earls of the realm. By this time the English rule in France had broken down, bringing the reigning house of Lancaster into great unpopularity, and throwing a correspondingly greater influence into the hands of the leader of the opposition, the Duke of York. He was brother-in-law to the Earl of Salisbury, and so attached to his party the powerful influence of the Nevilles. The Duke of York at first made no claim to the throne, demanding only that he should have his place in the councils of the king, and even when swords were drawn the Yorkists swore their allegiance to the king while fighting against his advisers. The Wars of the Roses (q.v.) began with the battle of St Albans (1455), which was gained to the Yorkists chiefly by the help of Warwick. By a sudden sally into the streets of the town he routed the royal forces, and gained for himself that character of daring and courage which he maintained to the end. He was rewarded with the post of captain of Calais, which he retained throughout the changes of the parties. In this position he was practically independent, and scoured the Channel at his pleasure. In 1458 he attacked some vessels which were under a treaty of peace with England, and being summoned to London to answer before the king, was violently attacked by the followers of Somerset and barely escaped with his life. In 1459 the civil war finally broke out. In the first campaign the Yorkists failed owing to their inactivity. The leaders fled to the coast of Devon, where they hired five men to carry them to Bristol. As soon as they left land, Warwick stripped to the doublet and took the helm, and steered straight for Calais, where he arrived in a few days. And when Somerset came to claim the keys of the stronghold, he had the mortification to find Warwick there before him.

Warwick was next in England on June 27, 1460, when he landed at Sandwich. In four days he was before the walls of London, having marched in that time a distance of 70 miles. In the beginning of July the battle of Northampton was fought. The Yorkists gained a complete victory, and took Henry prisoner. Before the fight Warwick issued the command to spare the common people but to slay the nobles, judging the quarrel to be more especially theirs, and it is significant that throughout the Wars of the Roses the proportion of leaders slain far exceeds that in any other war. Up to this time Warwick's conception of the war was merely the natural struggle of the one party with the other for power, using as their means the rude arguments of the time. He still maintained his loyalty to King Henry, and when the Duke of York after the battle of Northampton presented his claim to the throne Warwick opposed him, and prevailed upon him to waive it till the death of the king. But naturally such a state of things could not long endure. Warwick, while respecting the person of the king, was fighting against his orders, and so, while professing loyalty, was actually a rebel. Soon the struggle blazed out anew, and in December 1460 the Duke of York was defeated and slain at Wakefield. Early in 1461 Warwick was defeated in the second battle of St Albans, but the royalists not taking advantage of their victory, Edward, son of the Duke of York, accompanied by Warwick, marched on London, and was proclaimed king as Edward IV. Soon after the Yorkists gained a complete victory at Towton (1461), the bloodiest field of the whole war. Nearly all the Lancastrian chiefs were slain, Henry's cause was lost, and ere long he was captured by Warwick and lodged in the Tower. The credit of the crowning victory of Towton does not rest with Warwick alone, for he had the help of young Edward, a greater military genius than himself. Little is known of the details of the fighting, but we are told that wherever the Earl of Warwick was there the fight raged hottest. But now, when Warwick might have expected to reap the reward of his labours, new troubles arose. King Edward began to feel jealous of his power, his unique influence, and vast popularity. Warwick was sent to France to arrange a treaty with Louis, and to propose a marriage between Edward and his wife's sister. On his return he found the king married to Elizabeth Woodville, daughter of Lord Rivers, and an alliance made with the enemy of Louis, the Duke of Burgundy. Edward now lavished all his kindness on the Woodvilles, intending to use them as a counterfoil to the Nevilles, and for this purpose he deprived the Nevilles of some of their posts. By a series of deliberate insults Warwick was driven further and further away from the king, till he was forced into open revolt. Louis XI. used his influence in bringing Warwick and Margaret together, and they agreed to forget their differences in the face of a common enemy. Clarence, the king's brother, joined their party and married Warwick's daughter. Edward fled to Holland, and the king-maker placed Henry once more upon the throne. But ere long Edward secretly landed in England, raised an army not without difficulty, and met Warwick at Barnet. The faithless Clarence had in the meantime deserted Warwick and joined his brother's army. The army of Warwick was composed of strangely different elements—old enemies fighting side by side as friends. The battle was lost mainly through a grievous blunder. In the heavy mist which hung around the party of the Earl of Oxford was mistaken for the enemy and was attacked by their own friends. The cry of treachery was raised, and the whole army broke into utter rout. Warwick

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resisted till all hope was gone. He had fought on foot throughout the battle, and his heavy armour did not suffer him to escape. He was surrounded and slain, fighting manfully, April 14, 1471.

Thus fell on the field of battle Richard, Earl of Warwick, in the prime of his life, after sixteen years of deep intrigue and desperate fighting. Had he been born in a more peaceful time he would have been a great statesman, and have done much for the good of his country, for his talents were more political than military, and almost alone amongst the self-seeking rivals of the time he shows something of the instincts of patriotism. Cast as he was in the troublous times of the Wars of the Roses, he stands out in character and genius above all those of his generation. He was the best beloved man in the kingdom. When he was away from England, says Hall, the common people thought the sun had gone out of the heavens. His personality cast a charm over even Louis XI. The heart of the Yorkist party, he was true to its cause till he found that his service was no longer desired. He was not the man to sit quietly under insult, and when it came from King Edward, who owed all that he was to him, it was more than he could endure. Yet it was only when he found his every project thwarted, and especially those that were dearest to his heart, that he was driven into open warfare with the king. His treason is capable of much justification: he cannot be accused of forsaking his master. He had in him the making of a great king, and how great and useful might have been his career had fortune placed him over the councils of a Charles VII. or a Henry VI.! As it is, he stands in worth and character far above any of his time, a figure that commands not merely admiration but affection.

Lytton's *Last of the Barons* is but poor stuff as romance, and is not to be taken seriously as history. See Polydore Virgil, Waurin, and Hall; and of modern books, J. Gairdner, *The Houses of Lancaster and York* in 'Epochs of History' (1874), C. W. Oman's study in 'English Men of Action' (1891), and Sir James Ramsay's *Houses of Lancaster and York* (2 vols. 1892).

Warwickshire, a west midland county of England, bounded by the counties of Stafford, Derby, Leicester, Northampton, Oxford, Gloucester, and Worcester. It has an extreme length from north to south of 52 miles, an extreme breadth of 33 miles, and an area of 881 sq. m., or 563,946 acres. In the south are spurs of the Cotswolds, as the Edge Hills (826 feet); but elsewhere the surface is varied only by gentle undulations, formerly covered by the Forest of Arden. The Avon, flowing from north-east to south-west towards the Severn, is the principal river; but in the north is the Tame, a tributary of the Trent. New red sandstone is the chief formation, with lias to the south; and a coalfield, 16 miles by 3, extends from near Coventry to the Staffordshire boundary east of Tamworth. The output of coal in 1890 was 1,744,174 tons; and Warwickshire also produces some fireclay, ironstone, limestone, &c. About seven-eighths of the total area is in crops and permanent pasture; woods and plantations occupy nearly 21,000 acres. The great industries are noticed under Birmingham and Coventry; other towns are Warwick, Rugby, Leamington, Stratford-on-Avon, and Nuneaton. The county, which comprises four hundreds and 256 parishes with parts of seven others, is mainly in the diocese of Worcester. For parliamentary purposes it is divided into four divisions, each returning one member—the north or Tamworth, north-east or Nuneaton, south-west or Stratford-on Avon, and south-east or Rugby. The county councillors number seventy-two. The antiquities include a stone circle (the 'Rollright Stones'), Roman stations and roads, and a wealth of mediæval remains, as Warwick and Kenilworth castles. The battlefield of Edgehill must also be noticed; whilst of Warwickshire worthies may be mentioned Shakespeare, Baskerville, Samuel Butler, David Cox, Drayton, Dugdale, 'George Eliot,' Landor, Dr Parr, and Priestley. Pop. (1801) 206,798; (1841) 401,703; (1881) 737,339; (1891) 805,070.

See Dugdale's *Antiquities of Warwickshire* (1656; new ed. by W. Thomas, 2 vols. 1730), and later histories by W. Smith (1830), W. West (1830), J. T. Burgess (1876), and S. Timmins (1889).

Wash, a wide estuary on the east coast of England, between the counties of Lincoln and Norfolk, is 22 miles in length and 15 in average breadth. It is surrounded by low and marshy shores, and receives the rivers Witham, Welland, Ouse, Nen, and Nar. The estuary for the most part is occupied by sandbanks, dry at low-water, and between these sandbanks are the channels through which those rivers flow into the North Sea. On both sides of the channel by which the Ouse falls into the sea considerable tracts of land have been reclaimed. Anchorage is afforded to vessels by two wide spaces or pools of water, called respectively Lynn Deeps, opposite the Norfolk, and Boston Deeps, off the Lincoln coast.

Washing-machines. There are many kinds of domestic washing-machines. One of the simplest is the dolly, a wooden disc with three or more projecting arms placed horizontally on an upright shaft in a tub. The shaft is fixed in a step at the bottom and passes through a cross piece at the top, and is turned either by a cross handle or by simple spur gear. The arms are moved round backwards and forwards amongst the clothes. Nearly all domestic washing-machines consist of a tub or cistern of a form which suits the nature of the moving parts of the apparatus. Some operate by squeezing the clothes between grooved rollers, others by rubbing them between corrugated surfaces by a rocking or up and down motion, others again have a combined squeezing and rubbing action, while some are made on the principle of the old dash-wheel used in bleaching and dye works. Some recent washing-machines, which have been a good deal used, consist of a ribbed drum or cage formed of tubes fixed into the ends of the drum. The clothes are placed inside the cage, which is kept revolving in opposite ways by turns inside a thin metal case, the hot soapy water circulating freely between the tubes. See Frater's patent specification, No. 11,116, 15th September 1885. Machines of this kind can be heated with a Bunsen burner. One of the newest forms of washing-machine is on the principle of Carr's disintegrator. Many illustrations of washing-machines will be found in *The Illustrated Official Journal of Abridgments of Patents* issued by the Patent Office, and some improved forms of large washing and scouring machines used in factories are illustrated in recent volumes of *The Textile Manufacturer*. See also the article BLEACHING.

Washington, the most north-western state of the American Union, lies south of British Columbia, is bounded by Idaho on the E., Oregon on the S., and borders upon the Pacific Ocean on the W. From east to west it measures about 350 miles, and its width from north to south is about 200 miles. Its area is 69,180 sq. m., of which the water-surface occupies 2300 sq. m. It ranks eighteenth in area and thirty-fourth in population of all the states and territories.

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The Cascade Range (q.v.) traverses the state from north to south, forming a natural topographical division. For convenience the region between

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the Cascades and the Columbia River is described as Central Washington, and the portion east of the river as Eastern Washington. The summits of several of the volcanic cones are covered with perpetual snow, and the glaciers which fill their upper slopes rival in beauty the Alpine ice-rivers of Switzerland. Western Washington, which comprises about one-third of the state, is a mountainous region interspersed with numerous fertile valleys. The Coast Range to the west of the Cascades extends in broken and disorderly masses from the southern border of the state along the Pacific coast to Cape Flattery at the entrance to the Strait of Juan de Fuca. The mountains of this range increase in height toward the north, where they are known as the Olympic Mountains. Mount Olympus, the loftiest summit, is 8138 feet high. The coast is abrupt, except at Shoalwater Bay and Gray's Harbour, and many short and rapid streams flow down the western slopes directly into the ocean. The tide-water basin at the mouth of the Columbia River and the Chehalis valley, farther north, are the most important indentations of the coast south of the Strait of Juan de Fuca. This body of water, together with the extensive inland sea known as Puget Sound, affords some of the best harbours in the world, and is of great commercial importance. Puget Sound has a coast-line of more than 1000 miles, and receives the waters of numerous rivers. Central Washington is a lofty plateau region, its surface, like that of Eastern Washington, largely covered with lava and other volcanic products. It is traversed by spurs of the Cascade Mountains, and exhibits many abrupt changes of elevation. The Yakima River and other tributaries of the Columbia have carved deep valleys in the plateau. The streams are broken by falls and rapids, presenting a succession of varied and picturesque scenery. East of the Columbia the plateaus and plains are cut by the valleys of Clark's Fork and the Spokane and Snake rivers. In the north-east the surface is diversified by spurs of the Pend d'Oreille Mountains, and in the south-east the highest elevations belong to the Blue Mountains, which extend into the state from Oregon. The whole of the eastern part of the state and a portion of the region west of the Cascades are drained by the Columbia River, which for a distance of nearly 300 miles forms the boundary between this state and Oregon. In Western Washington, especially in the vicinity of Puget Sound, the winters are very mild. The rainfall is heavier than in any other portion of the United States. East of the Cascades the winters are colder and the rainfall lighter. The warm ocean current which bathes its western shores gives, however, to the whole state a climate much milder than that prevailing in sections to the east which have the same latitude. Lumbering is one of the leading pursuits. Western Washington is heavily wooded. Many of the trees are of enormous size, and in the density of their growth some of the forests are scarcely surpassed by those of the tropics. The soil is exceedingly fertile in many sections of the state. Portions of Central and Eastern Washington are well adapted for wheat-growing and grazing. There are extensive coalfields around Puget Sound, and coal-mining is an important industry. The fisheries along the coast, and the salmon-canneries on the Columbia River, are of considerable value.

Washington was first organised as a territory in 1853, with an area much greater than that of the present state. It was reduced to its present limits in 1863, and was admitted to the Union as a state in 1889. The state has thirty-four counties. Olympia, the capital, is situated at the head of Puget Sound. Seattle and Tacoma farther north on the eastern shore of Puget Sound, and Spokane Falls on the Spokane River, are the largest towns. Other places of importance are Walla Walla, Port Townsend, and Fairhaven. Pop. (1870) 23,955; (1880) 75,116; (1890) 349,390.

Washington is the name of over 200 cities, towns, townships, villages, and hamlets in the United States, of which the largest, after the federal capital, are (1) the capital of Daviess county, Indiana, 173 miles by rail W. of Cincinnati, with coal-mines near by, and a pop. of 6064; (2) the capital of Fayette county, Ohio, 77 miles by rail ENE. of Cincinnati, with a pop. of 5742; and (3) the capital of Washington county, Pennsylvania, 31 miles by rail SW. of Pittsburgh, with many mills and cigar-factories, coal-mines, and exports of wool, and containing the Washington and Jefferson College (Presbyterian; founded 1802). Pop. 7063.

Washington, RULES OF. See NEUTRALITY.

Washington City, the capital of the United States, is situated in the District of Columbia (q.v.), on the Potomac River, in 38° 53′ lat., 77° 2′ long., distant 226 miles S. from New York, 136 from Philadelphia, and 40 from Baltimore. The city covers an area of about 10 sq. m., or, with its suburbs of Georgetown (now West Washington) and the country portion of the district, 70 sq. m. Out of the 6111 acres covered by the city proper the streets and avenues occupy 2554 acres, and the government reservations (parks, &c.) 541 acres, thus leaving more than half its area permanently free from the encroachment of buildings. Besides the numerous small parks, Washington has a zoological park of 140 acres, and the Rock Creek Park of over 1500 acres, purchased in 1892 for $1,200,000, and extending for miles along the picturesque banks of a stream, amid forests of great natural beauty. There are 170 miles of paved streets and avenues, and 65 miles of unimproved streets. The improved streets are chiefly paved with asphalt, and all are thickly planted with shade-trees, numbering over 85,000, of many varieties, maples predominating.

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The architecture of the city in the older settled districts is cheap and commonplace, but in the newer Washington is of striking variety and attractiveness. The government buildings are mostly fine and imposing structures. The Capitol, in which the national congress meets and the supreme court holds its sittings, is conspicuously placed on an eminence, commanding a noble view. Its lofty iron dome, crowned by a bronze figure of Liberty, is 285 feet in height, its length 751 feet, and its total cost about $14,000,000, including repairs. The central rotunda contains some elaborate frescoes, and historical paintings by Trumbull (q.v) and other artists. The hall of the House of Representatives is a spacious apartment, with desks for 356 members, and seats in the galleries for 1500 spectators. The Senate Chamber, with eighty-eight senators, accommodates 1000 spectators. The National Memorial Hall in the Capitol is to receive statues contributed by each state to commemorate two of its distinguished citizens. The Treasury Department at Pennsylvania Avenue and Fifteenth Street, built of freestone and granite in the Ionic style, cost $7,000,000. The Interior Department, in which is located the Patent Office, occupies an entire square in the heart of the city, and is constructed of white marble, in pure Doric, costing $3,000,000. The Post-office Department opposite is a fine marble edifice of the Corinthian order of architecture. The granite building erected for the departments of state, war, and navy, in Renaissance style, is the largest

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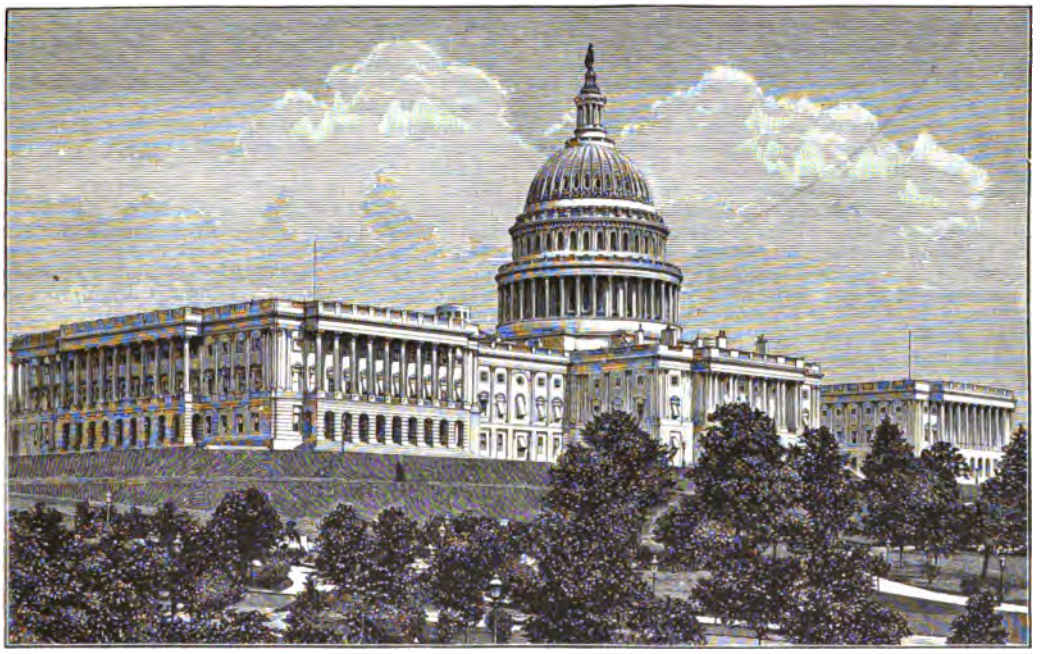
public edifice in Washington, covers 4½ acres, has 566 rooms, and cost $11,000,000. The new Congressional Library building, on Capitol Hill, is built of solid white granite, in Italian Renaissance style, with iron, marble, and brick interior, and will cost $6,000,000. The president's house, and executive mansion, is a plain edifice of freestone, in classic style, painted white (whence called 'the White House'). The other public buildings embrace the Agricultural Department, the Department of Justice, the Pension Office, the National Museum, the Bureau of Engraving and Printing, the Army Medical Museum, the Coast Survey buildings, and the Smithsonian Institution. All of these are of brick, except the last, which is built of red sandstone, in the Byzantine style, with picturesque towers. The national monument to Washington is a towering obelisk of white marble, 555 feet in height, on the bank of the Potomac, erected at a cost of $1,230,000. The United States Naval Observatory, also of white marble, occupies a retired and commanding site on Georgetown Heights.

The National Soldiers' Home, 2 miles above the city, founded in 1851, has 600 acres of improved park and forest, and serves as free driving park and attractive rural resort, besides its primary function of providing a comfortable home for old and invalid soldiers of the United States army. The National Asylum for the Insane, on the heights above the Anacostia, or eastern branch of the Potomac, has nearly 1000 inmates, who must be either of the army or navy, or residents of the



The Capitol, Washington.

District of Columbia. There are five hospitals, five orphan asylums, a foundling hospital, and several homes for the aged, for widows, and for the indigent. Washington is rich in institutions of learning, and its free public museums, libraries, and art galleries afford invaluable aids to those pursuing academical or professional studies. The Columbian University, founded in 1814, Georgetown College (Roman Catholic), dating from 1789, the National University, and Howard University (for coloured students) have each departments of law and medicine, besides the regular college course. The Catholic University of America, established in 1887, has two fine stone buildings just outside the city limits, the Divinity College being fully organised, and the Hall of Philosophy soon to be opened. The American University, under charge of the Methodists, has its grounds above Georgetown, and is expected to raise $10,000,000 for buildings and endowment. The National Deaf-Mute College, founded in 1864, is a government institution for the education of deaf and dumb pupils from the army, the navy, and the District of Columbia. Its fine stone buildings lie just north of the city. Gonzaga College (Catholic) is on I Street. There are three business colleges, several seminaries for young ladies, five classical schools, schools of languages, elocution, &c., and a large number of private schools. The public school system is in a high state of efficiency, 35,764 pupils being enrolled in the common schools out of a school census of 52,590. There are 97 public school houses, with 680 teachers, and annual expenditure of about $950,000. The Smithsonian Institution (q.v.), founded in 1846, affords valuable advantages to all institutions of learning, in the United States and abroad, through its system of international exchanges and by its numerous publications of the fruits of original research in many departments of science. The National Museum, originally established to exhibit the rich contributions given to the government by various countries from the World's Fair at Philadelphia in 1876, has become a most extensive and instructive collection of antiquities, ethnology, geology, and natural history generally

Of bronze statues erected in honour of famous men Washington has an abundance—mainly to military characters. Already hardly a public square or circle is without its monument. Equestrian statues of Washington, Jackson, Greene, Scott, Thomas, and McPherson are erected, besides full-length statues of Lafayette, Luther, Franklin, Chief-justice Marshall, Lincoln, Garfield, Professor

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Henry, Farragut, General Rawlins, and Admiral Dupont. Washington has no less than 182 churches. The city is abundantly supplied with pure water, by a conduit 15 miles long, from the Great Falls of the Potomac.

While Washington has few manufactures, no foreign commerce, and but little shipping (being dependent on Georgetown for its small harbour facilities), it has a distinction, as the seat of the general government, to which no other city in the Union can lay claim. The annual assemblage of congress attracts a large influx of visitors from all parts of the country, while the great and far-reaching business of all departments of the government requires a small army of officers and clerks for its transaction. The various bureaus employ between 6000 and 7000 persons. The city is to a great degree populated by the official class, and by merchants, artificers, and small manufacturers who supply their wants. The number of hotels and boarding-houses is very great. A steadily increasing number of people of wealth and taste are building residences at the national capital, where the presence of the diplomatic corps and of travellers and sojourners from all parts of the globe renders the society in a large sense cosmopolitan. The absence of smoky manufactories, the genial and salubrious climate, the pleasant situation and attractive suburbs, with the wide and smooth streets, contribute to render a residence in Washington during most of the year agreeable. The summer brings torrid heats, as in most cities and large towns, though not always long continued. The average temperature of the winter is 36°, spring 55°, summer 76°, and autumn 56°; for the whole year the mean is 56° F.

The government of the Federal City (as President Washington called it, until the commissioners gave it his name in 1791) has been since 1874 vested in a commission of three officers, appointed by the president and senate. They have charge of all municipal and administrative affairs, police, street-improvements, schools, &c., while congress is the sole legislature of the city and district, the citizens having no suffrage. As the government owns nearly half the property in the district, and the city exists largely for the benefit of its officers—legislative, executive, and judicial—it has been settled by act of congress that the government pays half the annual expenses of the city government, the other moiety being taxed upon the property of the citizens. This government by commission has on the whole worked well in practice. The final location of the national capital at Washington, to which it was removed from Philadelphia in 1800, was the fruit of a compromise, after a long struggle between the advocates of various cities in congress. The votes of those who favoured a wholly new settlement for that body, to avoid what were feared as local and sectional influences of the great cities, joined to the advocates of assumption of the state debts by the nation, carried the day for a location in what was then a wilderness. Various attempts were made, owing to the early discomforts of the capital, to change the seat of government. These were renewed in 1814, after the burning of the Capitol by the British army, and in 1846, on occasion of the ceding back to Virginia of her share of the District of Columbia. But the steady growth of the city and the public buildings, with the difficulty of agreeing upon any new or more central site, finally put to rest the agitation for removal. After the civil war of 1861-65 Washington began to move forward in a new career of prosperity. Its unpaved and unsightly streets were taken in hand, its defective sewerage system was radically reformed, its steep grades were reduced, thousand of shade-trees were planted, and the town was transformed in a few years from a neglected and repulsive place to a beautiful and attractive city.

The original plan of Washington City was made by L'Enfant, a French engineer who had adopted America as his residence. Based largely upon the topography of Versailles, its characteristic features are the crossing of the rectangular streets by frequent broad transverse avenues, 160 to 120 feet wide, and the numerous circles and triangular reservations interspersed as little parks throughout the city. With a foresight of the future greatness of the country which now seems marvellous, the whole city was laid out on a scale so ample, with such wide spaces between its public buildings, as to lead to much cheap ridicule of Washington as 'the city of magnificent distances.' These distances, however, are now found not a whit too great, when the comfort and health of a teeming population are to be provided for. The population of Washington in 1800 was 3210; 1860, 61,122; 1880, 147,293; 1890, of the District, 230,392.

Washington, GEORGE, was born February 22 (New Style), 1732, at Bridges Creek, Westmoreland county, Virginia. He died, without issue, December 14, 1799, at Mount Vernon on the Potomac. He came of good English stock, being descended from the Washingtons of Northamptonshire. At an earlier time the family seems to have lived in the more northern part of England, and we cannot be far out of the way in tracing his origin to the mingled Norse and Angle blood of Yorkshire. In 1658 George Washington's grandfather, John Washington, first appeared in Virginia, and soon acquired wealth and position. He commanded the Virginia militia in the disgraceful attack on the Indians in Piscataway Fort, Maryland. For his share in this enterprise he was reprimanded by Governor Berkeley. The people, however, seem to have been on his side. He died soon after, and took no part in Bacon's rebellon against Berkeley (1676). John Washington's second son, Augustine, was the father of George Washington, by his second wife Mary Ball. Augustine died while George was still a mere boy, leaving a large family, and means inadequate to the upbringing of the younger children.

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Nothing is known of Washington's childhood, notwithstanding the many stories which have gathered about his name. He seems to have been a good, healthy boy of strong physique, with a sobermindedness somewhat beyond his years. In 1747 he went to Mount Vernon, the residence of his half-brother Lawrence, who, as the eldest son of Augustine Washington, had received the better part of the Washington property, and an English education. The removal was a good thing for the boy, as it gave him access to books and to better teachers, and brought him into contact with the Fairfax family, to which Lawrence Washington's wife belonged. His love of hunting seems to have been the thing that attracted Lord Fairfax to him. At all events, in 1748, when Washington was sixteen years of age, Lord Fairfax employed him to survey the property in the Valley of Virginia which he had inherited from the avaricious Lord Culpeper of Charles II.'s time. Surveying alternated with hunting, and the winters were passed at Mount Vernon. Still Washington acquired from these expeditions habits of self-reliance and endurance which such a life alone teaches. In 1751 he accompanied his brother, who was dying of consumption, to the Barbadoes; and this seems to have been the only time he went beyond the limits of the continental colonies. In 1752 Lawrence Washington died, leaving him guardian of his only daughter, and heir to his estates in the event of

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that daughter's death without issue. Lawrence Washington had seen some service with Admiral Vernon, and, either because he noticed warlike ability in his younger brother or for some other reason, determined to give him a military training. He therefore invited two of his old comrades in war to Mount Vernon, and there in the intervals of surveying and hunting Washington was taught the manual of arms and the elements of the art of war.

The French at this time (1752) were connecting their settlements on the Great Lakes with those on the Mississippi by a chain of posts on the Ohio. This region was regarded as within the sphere of English influence—to apply a phrase of the day to the earlier time. Governor Dinwiddie of Virginia determined to warn the intruders off. He sent one messenger who returned frightened before half the distance had been accomplished. Looking about for a more efficient messenger, his attention was called, perhaps by Lord Fairfax, to young Washington, and he was sent. This time there was no turning back, and the task was performed in the same relentlessly thorough way so characteristic of his later doings. There has come down to us a journal describing this trip, and it is one of the pleasantest bits of writing from Washington's pen. The French, however, paid no attention whatever to his warning. Dinwiddie determined to drive them off by force, and an expedition was sent against them of which Washington was nominally second in command. In reality, owing to the death of his superior, he was in command during the important part of the campaign. The event was unfortunate. Washington was driven back, surrounded, shut up in a little fort commanded by higher ground, and forced to surrender. But he had learned a valuable lesson in military science. It was at this time that an order was issued from the headquarters of the English army to the effect that any field-officer holding a royal commission could command a colonial officer, no matter what the respective ranks of the two men might be. Washington, notwithstanding his love of war, at once resigned. He was induced, however, to serve on Braddock's personal staff, a position which made him independent of the regular officers. In this capacity he gave a great deal of good advice, which was disregarded, and saved the remnant of the van of Braddock's army. He was then placed at the head of the Virginia forces, and in 1756 visited Boston to see General Shirley, the English commander-in-chief, and settle the matter of rank. This was arranged to Washington's satisfaction, and he continued in the service. This journey to Boston and back made Washington's face and figure known to many persons in the Middle and New England colonies, and undoubtedly contributed in no small degree to his selection as commander-in-chief in 1775. For the remainder of the war he did what he could, giving advice to English generals—which was seldom followed—and extorting money and supplies from a reluctant legislature. But barren of tangible results as these years were, they were nevertheless the most important in that formative process which made him the patient, tenacious, clear-headed man of the revolution. This struggling was a mere foretaste of what was coming to him.

The years from the close of the Seven Years' War (1763) to the meeting of the Continental Congress in 1774 are the most attractive in Washington's life. He seems to have had more than his share of love affairs, but none led to marriage, until in 1758 he fell in love with a rich young widow, Martha Custis (1732–1802). The wooing was short, and the marriage was celebrated in 1759. His niece was now dead, and the combined estates of Mount Vernon and of the widow Custis made him one of the richest men in the land. He kept open house, entertained liberally, led the hunting, and produced honest grain and tobacco. Virginia life in those times was rude and boisterous. Yet one likes to look back on it and see the young Virginia colonel leading the life of his day, such as it was. He represented his county in the House of Burgesses, and acted as vestryman of his parish. From this peaceful life, however, he was once more to emerge and place himself at the head of the resistance to England.

Familiar with war, Washington wished to try all peaceful measures first, and was thus one of the leaders in the anti-importation movements. But as time went on he became slowly convinced that nothing save force would secure to his countrymen their rights. The question at issue was really the same as the dispute about military precedence. Washington, regarding himself and his countrymen as the equals of any subjects of George III., believed in self-government for America, and prepared to oppose coercion by force.

He represented Virginia in the First and Second Continental Congresses, and at once took a leading part. He was no orator like Patrick Henry, nor writer like Thomas Jefferson. But in rude common sense and in the management of affairs he excelled them all. More than this, however, he was the one American soldier of national reputation, and when congress organised the national resistance he was necessarily appointed commander-in-chief. He possessed remarkable powers as a strategist and tactician, but it was as a leader of men that Washington stood forth pre-eminent. There seems to have been something in his bearing and presence to inspire confidence. He also possessed the happy faculty of always rising to the dignity of the occasion, while never going beyond what the occasion demanded. It was this composed, well-dressed gentleman who took command of the New England farmers and mechanics assembled at Cambridge in the summer of 1775. At first he did not understand them, nor they him, but before long he brought order out of confusion, and at the same time won the love and respect of his men. It seems scarcely credible that these half-disciplined, half-armed men should have held cooped up in Boston a comparatively large, thoroughly-disciplined and well-equipped army, and still more incredible that they should have compelled its final departure. Of course the retreat from Concord and the slaughter at Bunker Hill had much to do with it. But these disasters were themselves due to the incompetence of the English commander. Indeed Washington's fame as a military man was dimmed by the incompetency of his opponents. The only really able commander opposed to him was Cornwallis, and he was hampered in the campaigns where they were opposed by the stupidity of his immediate superior. Whether a strong, able man could have brushed aside the besiegers of Boston may perhaps be doubtful. But it can hardly be maintained that such a man would have allowed Washington to save his army in the autumn of 1776, and certainly he would have made such a crushing campaign as that of Trenton impossible. It is a part of the art of war to judge one's opponents correctly, and Washington, judging his opponents correctly, undertook movements which, under other circumstances, should have cost him his army. In fact it may be said that his battle was not with the enemy, but with his friends. His army was always crumbling to pieces owing to short enlistments, and the very necessaries of life were sometimes unattainable. But through it all Washington appears, except on the rare occasions when he lost control of his temper, the same silent, composed, well-dressed gentleman.

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The end of the war came, and with it the temptation which comes to successful commanders in civil wars. The army wished to make him ruler of the country—partly through respect for him, partly to secure the pensions and lands which had been promised them by congress. On his side Washington wished to lead his countrymen into orderly government out of the confusion and chaos in which they were then involved. The easy way to the accomplishment of this purpose would have been to make himself the lawgiver. He might even have founded a dynasty. But Washington never for one moment faltered. He had fought the great war to secure the rights of his fellow-countrymen, not for his own aggrandisement. Singularly enough there are persons who almost blame Washington for preferring his country's good to his own greatness.

Washington retired to Mount Vernon and turned his attention to securing a stronger government by constitutional means. Society seemed almost falling to pieces. By 1787 matters had reached such a pass that even congress moved, and a convention of delegates from twelve states met at Philadelphia and formulated the present constitution of the United States. Over the deliberations of this convention Washington presided. The government under this constitution began in 1789 with Washington as first chief-magistrate or president.

To his new office he brought the same qualities which had contributed so much to the success of the revolution—the same honesty of purpose and dignity of character. As soon as it was fairly started, the people saw that the new government was entirely unlike the old. It was a strong consolidated government, as the enemies of the constitution declared it would be. Parties were formed, led by Washington's two most trusted advisers, Jefferson and Hamilton. Washington's position with regard to these early parties has been a subject of dispute ever since his death. One set of biographers represent him as standing apart and above faction, as striving to moderate the asperities of political life. They point to the fact that Jefferson, a known opponent of the constitution, was called to the highest position in the cabinet, and assert that upon his retirement the place was offered to Patrick Henry, who had opposed the ratification of the constitution more strenuously than any other man. Another set of biographers represent him as a party man and leader of the Federalist or strong government party. They assert that at the time of his appointment Washington was not aware of Jefferson's opposition to the constitution. They furthermore deny that the secretaryship of state was ever offered to Henry, and point to the fact that Washington called himself a Federalist in a letter written in 1799. Probably there is truth in both views. At the outset it seems that Washington was desirous of enlisting on the side of the new government the ablest men in the country, whether they had approved or disapproved the precise form of the constitution. As time went on, however, it became evident that those desiring greater liberty for the individual would no longer be content with passive opposition. A strong party, almost at once, sprang into life, and began a campaign which has never been surpassed for personal abuse and virulence. Stung by their taunts, Washington lost his faith in American institutions, and went over heart and soul to the Federalist party. He declared in one letter that he had been attacked in such 'indecent terms as could scarcely be applied to a Nero, a notorious defaulter, or even to a common pickpocket.' In another letter he proposed that none but persons of 'sound politics' should be appointed to high offices in the army, and was doubtful of the advisability of admitting members of the opposition or Republican party to the army at all—thus proscribing about half the male population of the country as persons who could not be trusted. Fortunately the election which occurred soon after these letters were written turned the government over to the care of Jefferson and the party which abetted 'the nefarious views of another nation upon our rights,' to use Washington's own words. He did not live to see how wholly in the wrong he was, as he died a few months after these sentences were written.

At the outset it seemed desirable to surround the new government with ceremony and show. Washington therefore was accustomed to open congress in person, driving there in a cream-coloured coach drawn by four or six white horses, with servants in livery. He made a speech to the assembled legislators, and they, in return, addressed him—all being apparently modelled on the English customs. Then, too, his receptions were more formal, if possible, than those of royalty itself. Washington held his hand behind his back, and bowed civilly to those who were presented to him. All this savoured of monarchy, and the opposition, seeing their chance, charged that Hamilton and the Federalists intended to introduce monarchy. There is no reason to suppose the charge true—although Hamilton no doubt preferred a monarchical form of government. But the people believed it to be true.

In great contrast to this violence on either side was Washington's farewell address, advising his countrymen above all to 'be Americans.' In fact, of all the many striking things in Washington's life and work his Americanism stands forth. At a time when those about him were provincials, he was an American. He thought America should stand aloof from the conflicts of Europe, and inaugurated a policy of neutrality which has remained the policy of the country from his time to ours.

Washington's early education was poor, and he began his life-work at the age when most boys are entering upon a college career. This deficiency in his training was more patent to him perhaps than to any other person. To the very last he was engaged in remedying this defect, and died a fairly well read man in history and politics. He knew no language but his own, but he was familiar with the masterpieces of the English tongue.

For a list of Washington's writings, see Winsor, *Narrative and Critical History of America*, vol. viii. pp. 416 *et seq.* Many were published, with a Life, by Chief-justice John Marshall (5 vols. 1804); and a new edition of his complete works, containing many letters and papers not previously published, has been prepared by Worthington C. Ford (vol. i. New York, 1888). The Life by Washington Irving (5 vols. 1855-59; abridged and revised by John Fiske, 1888) must be mentioned out of many. The best study of Washington as a man is Henry Cabot Lodge's *George Washington*, in the 'American Statesmen' series (1889). Reference may also be made to Thackeray's *Virginians*.

Washington and Lee University, at Lexington, Virginia, was founded in 1782 by the Rev. William Graham as an academy at Timber Ridge meeting-house, was afterwards developed into Washington University, and finally received its present name in honour of General Robert E. Lee, who after the civil war became its president. He is buried in the college chapel, where a noble recumbent statue in marble marks his resting-place.

Washita, or OUACHITA, a tributary of the Red River (q.v.) in Arkansas and Louisiana, noted for its novaculite Whetstones (q.v.).

Wasp, a popular name for Hymenopterous insects belonging to the family Vespidæ, or to

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closely related families. Thus the Sphex (q.v.) is a wasp in the wide sense, but it is not a member of the family Vespidæ. All the stinging Hymenoptera to which the title wasp may be applied differ from bees (Apidæ) in the character of the first tarsal joint of the hind-leg, which is neither very broad nor very hairy; nor do they store honey as is the habit of so many bees, but simply prey upon the sweet juices of fruits and other parts of plants. The true wasps of the family Vespidæ are further characterised by the way in which the anterior wings are longitudinally folded, each being doubled on itself down the middle, and by the nature of the antennæ, which are usually 'kneed' at the end of the first joint, and have thirteen joints and a clubbed end in the males, twelve joints and hardly any apical thickening in the females. Moreover, as is well known, wasps are generally more slender and much less hairy than bees. About 1000 different species of Vespidæ are known; representatives are found in almost every part of the globe; many live socially, and like the social bees have workers in addition to the two sexes; others are solitary in habit and without workers.

The social wasps—e.g. species of Vespa and Polistes—build papery nests which in intricacy and beauty of architecture rival the achievements of the hive-bees. Begun by the queen-wasp, who alone survives the winter, and completed by those of her offspring who develop into workers, these nests are composed of masticated vegetable matter, generally woody fibres worked into a paste with the viscid secretion of the salivary glands. A variable number of combs, each one cell deep, are connected together by a scaffolding of the same material, and often surrounded by external walls with one door in aerial nests, usually with two in those which are built underground. The cells, which are used as cradles for the developing eggs and grubs, are hexagonal in outline, and their openings generally look downwards. The site of the nest is very varied: the Hornet (q.v.; *Vespa crabro*) usually chooses the hollow of a tree, the common wasp (*V. vulgaris*) builds in the ground, the wood-wasp (*V. media*) hangs its oval nest from the

Nest of Wood-wasp (*Vespa media*).

branches of a tree. Moreover, within one species there is no rigid adherence to one situation; thus the nests of the hornet and the common wasp are often built under the eaves of houses. Nor is the framework always of a papery texture, for some species of Polybia common in South America use earthy materials. In size too there is great variety, from a few inches in girth to five feet in length, and within the same species there are wide limits according to the strength and prosperity of the society.

In illustration of the annual life of the social Vespidæ, the history of the common British wasp may be outlined. As in other wasps of temperate countries, the sole survivor of the winter is a queen or female who has lain in shelter since her impregnation the previous autumn. In early spring she awakens from her torpor and seeks a site for the nest. A suitable hole is found, a foundation of wood-scrapings is laid, a foot-stalk is reared to support the first two or three layers of cells, these are covered by an umbrella-like roof, and an egg is laid in each. More cells are made, and more eggs are laid. As the first laid eggs hatch, the walls of the cells are raised in relation to the increasing size of the grubs, which eventually shut themselves in with a silken lid. During growth, however, they have required food—nectar from flowers, juices of fruits, honey stolen from the bees, and the like—and the mother-wasp has a busy life. But the period of pupation is short, and soon there emerge workers who lighten their mother's labours. They make more combs, the female lays more eggs, more workers are born, and, as autumn draws near, females and finally males. The young females and the males quit the nest in a nuptial flight which secures the continuance of the species, while the workers left in the nest evict the remaining grubs, and themselves await death. In some cases the story is complicated by the fact that the rudimentarily sexual workers may produce parthenogenetic eggs which develop into males. The food of wasps consists of the juices of plants, sweet fruits, the nectar of flowers, and honey-dew, but they are sometimes carnivorous, preying upon other insects, larvæ, spiders, and even on the corpses of larger animals. All who have sat at lunch in the country during a hot summer know with what pertinacious daring the wasps which enter by the open windows attack not sweets only, but all sorts of palatable viands. Although wasps are very destructive of fruits, it must be noted in their favour that many of them destroy other insects, grubs, and caterpillars. The stinging-organ is, as usual, an ovipositor, and not of course possessed by the males. In structure and mode of action it generally resembles that of Bees (q.v.). The poison which enters the wound made by the sharp little instrument produces painful inflammation, especially in the case of hornets, but unless the stings be numerous injurious results are rare. It is well, however, to take means to allay the inflammation—e.g. by hot-water fomentations, or by the homely remedies of indigo-blue and soap and sugar, which are usually sufficiently effective.

Nest of Common Wasp (*Vespa vulgaris*) seen from below.

The solitary wasps, also included in the family Vespidæ, have no workers; they usually build single cells of clay or sand; and they are also distinguishable structurally from the social forms. Thus the mandibles are generally long and narrow, not broad, the tarsal claws are toothed, and so on. They are generally smaller than the social wasps, and darker in colour. The nest is oftenest in a hole, and is very generally provisioned with insects

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or insect-larvæ for the use of the offspring. A well-known representative is the Wall-wasp (*Odynerus parietum*), common in Britain and throughout Europe; it digs a hole in walls and builds a projecting tubular porch, at first straight, but towards the end bent downwards; the hole is stocked with paralysed grubs and caterpillars, and among these an egg is laid. Other common genera are Eumenes and Pterochilus.

Besides the Vespidæ there are, as has been already noticed, a number of families the members of which may be popularly called wasps. Thus there are the burrowing sand-wasps or Crabronidæ, —e.g. Sphex (q.v.), Ammophila, Crabro, Dinetus, Bembex; the nearly related Pompilidæ, with similar habits—e.g. Pompilus (one species of which preys upon the large spider Mygale), Priocnemis, Pogonius, Cercopales; the Heterogyna—e.g. Sapyga, which usurps the burrows of other insects, and Mutila, whose larvæ are parasitic in the nests of humble bees; the small golden wasps, cuckoo-flies, or Chrysididæ—e.g. Chrysis—which lay their eggs in the nests of bees or wasps.

More distantly related to the wasps are those Hymenoptera in which the females have, instead of a sting, a boring ovipositor, by means of which the eggs are laid in other insects or in plants. Such are the Ichneumonidæ, Evaniidæ, Braconidæ, Chalcididæ, Cynipidæ, Uroceridæ, &c.

See BEES, INSECTS, SPHEX, STINGING ANIMALS; Lubbock's *Ants, Bees, and Wasps;* the continuation of Buffon (Par. 1836–46); Saussure on the Vespidæ (Par. 1852–57); and German works by Schenk (1861) and Taschenberg (1866).

Waste Lands, according to the general use of the term, are uncultivated and unprofitable tracts in populous and cultivated countries. The term waste lands is not employed with reference to land not reduced to cultivation in countries only partially settled. There is a large extent of waste lands even in the British Islands. Of the 77,800,000 acres which they contain only about 48,100,000 are arable land and improved pasture; 3,000,000 acres are occupied with woods and plantations; about 7,000,000 acres in Scotland consist of sheep-pasture, generally at a considerable elevation, and little improved by art; 8,000,000 acres in Ireland are unenclosed pasture, generally quite unimproved; over 4,000,000 acres are mountain and bog; and the remainder consists of unimproved and very unproductive land of other kinds.

The waste lands of Britain are of very various character. Some of them are bogs, already sufficiently noticed in the article BOG. Others are marshes and fens, generally very near the level of the sea, and often within the reach of its tides, chiefly in the eastern counties of England (see BEDFORD LEVEL). There are also extensive moors both in England and in Scotland, often of very poor soil, and often also at such an elevation above the level of the sea as to render profitable agriculture hopeless. This is not the case with all the moors, and it is sometimes possible to effect great improvement by drainage; so that land, formerly almost worthless, may be converted into good pasture. The highest sheep-pastures of the south of Scotland have been greatly improved by a kind of superficial drainage (*sheep-drains*), consisting of mere open channels for water; but in the greater altitudes of the Highlands, and amidst their more rugged steeps, even this is out of the question. The chalk *downs* of the south of England may, in great part, almost be considered as waste lands, although in several parts they afford excellent pasture for sheep; while in certain districts they have been found capable of great improvement, in a slow and gradual manner, by tillage and the application of manures. Sands near the seashore are fixed by sowing certain grasses, and are capable of further improvement by cultivation and the application of manures; particularly where the sand is in considerable part calcareous. The most barren and hopeless sands are those which are almost entirely siliceous.

In Scotland, during the first eighty years of the 19th century, a large extent of waste land was by reclamation transformed into fairly good arable land. This process of reclamation was pursued to a lesser or greater extent in all the counties embracing mountain or moorland. It was most active in the northern counties, notably in the county of Sutherland, where between 1870 and 1880 the Duke of Sutherland expended nearly £200,000 in the reclamation of land. The Sutherland reclamations attracted great attention at the time, and were visited by many agriculturists from foreign countries as well as from distant parts of the United Kingdom. Viewed financially the reclamations have not been successful. The cost of the work was great, from £22 to as high as £65 per acre, and the benefits resulting from the reclamation have been lessened by the fall in the prices of agricultural produce. Already portions of the land have returned to a semi-waste condition. The advance in wages and the decline in the prices of agricultural produce have brought land reclamation almost to a stand-still.

See the articles COMMON, DRAINAGE, HOLLAND, IRRIGATION, LANDES, PEAT, POLDER, WARPING, ZUIDER ZEE.

Waste Products, UTILISATION OF. By 'waste' is generally meant such material as is rendered either wholly or partially useless in the manufacture of products and articles of all kinds, but the name is sometimes retained long after a substance, at one time of little or no value, has been utilised. 'Waste-silk,' for instance, is now a valuable material, although this name for it is kept up. If envelopes are cut out of a roll of paper, parts of dress out of a web of cloth, and round covers out of sheets of tinplate, 'waste' pieces are unavoidably left. There would be more loss than gain in manufacturing such materials into the shapes required for specific articles. Again, when iron ore is smelted, or coal distilled, or common salt converted into soda, waste in some form results from the operations. In every manufacturing process, mechanical or chemical, there is waste. The examples given relate to new waste, but nearly everything we use wears, or corrodes, or gets broken or unshapely, and so rags, and rust, and scraps arise. Rags of all kinds are nowadays so much in demand that they are only waste in a nominal sense. On the other hand, the rust which arises from corroding iron is utter waste, since it can never be profitably collected at all. In respect to the value of 'waste,' these two, among familiar things, may be taken as at opposite extremes.

There is a kind of waste, for the most part difficult to prevent, which goes on in the consumption of fuel, and in certain processes of roasting or calcination in the smelting of metals. Roundly speaking, the best designed steam-engines and boilers require only half as much coal per horse-power per hour as those less skilfully constructed, and the fuel unnecessarily consumed by bad boiler-furnaces is largely wasted as smoke through imperfect combustion. The Siemens regenerative furnace (see Vol. V. p. 239) is most ingeniously constructed for the saving of waste heat. The utilisation of blast-furnace gases (see IRON) for heating purposes, and the recent recovery of Tar (q.v.) and ammonia also produced by the coal consumed in these furnaces, form an instance of a double saving from the same source. In the report of the chief-inspector of alkali works for 1891, it is stated that the plant put up in recent years for collecting tar, ammonia,

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&c. at fifty-seven Scotch blast-furnaces has cost £444,600, a sum fully equal to the cost of building the furnaces themselves. The condensing flues, miles in length, connected with some lead-smelting furnaces (see LEAD) are modern examples of appliances to condense lead fume or smoke which formerly was allowed to escape, causing much loss of lead. In striking contrast to these we may state, while speaking of gaseous products, that over a large district in the south of Spain where cupreous iron pyrites occurs abundantly the barbarous practice is being continued of burning this pyrites in the open air (to get rid of its sulphur and so lighten its weight), to the destruction of vineyards and other vegetation, and to the loss of an enormous amount of sulphur sent into the air in the form of sulphurous acid. The acid used in 'pickling' iron plates which are to be tinned or galvanised is now recovered. See GALVANISED IRON, and TINPLATE; also NAILS, for use of tinplate scraps.

Some instances of how waste in a solid form arises in working rock and other mineral substances may now be given. In shaping and dressing granite paving-stones as much as three-fourths of the rock quarried is, in some instances at least, wasted. This waste is as yet only very partially utilised for road-metal, and in small chips for 'granolithic' pavements. Coal 'dust' is made into Briquettes (q.v.) for burning in fires. The utilising of the vast waste heaps of spent shale at the Scotch mineral-oil works is a problem which awaits solution. The oil shale of the carboniferous formation in Scotland, from which Paraffin (q.v.) and paraffin-oil are obtained, was itself looked upon as of no value till 1859. Blast-furnace slag (see SLAGS) is now utilised in several ways, and in a number of cases the accumulations of other kinds of slag on the sites of ancient smelting-works have, in modern times, been again put through the furnace to extract the metals left in them, with profitable results. Some of the refuse from the old silver-mines of Laurium (q.v.) has been bought up by capitalists for this purpose. One instance, though not of very recent date, may be given where, by the production of a by-product, a fortune was very quickly amassed. About 1840 Mr Askin of Birmingham discovered a method of separating cobalt, in the form of oxide, from nickel, two metals which were very difficult to separate. This oxide of cobalt was at first a waste product, but before very long it was put into the hands of potters, who readily bought it up to produce a blue colour on their ware, at the then rate of two guineas per pound. Among comparatively recent instances of utilisation of by-products and waste products in the chemical industries, we may refer to the importance of the substances now extracted from Coal-tar (q.v.), and the great value of some of them in the manufacture of dyes (see DYEING). Another example is the recovery of binoxide of manganese in the production of chlorine for the manufacture of bleaching-powder by Weldon's beautiful process. Formerly for every 100 lb. of bleaching-powder made about 100 lb. of the native oxide of manganese were required. Now this manganese is recovered and used again and again in the process, with only a loss of about 5 per cent. to make up each time it is returned to the chlorine still. The earlier methods of recovering manganese were not nearly so perfect, and therefore were not much used. A process for the utilisation of chemical waste on a great scale is Chance's method, patented in 1888, of recovering sulphur from alkali makers' black-ash refuse (see SODA).

Passing to vegetable substances, the various materials besides Rags (q.v.) used in the manufacture of paper may be first noticed. Straw, wood, and esparto fibre, if not exactly waste products, were at least undeveloped substances before they became, as they now are, so largely used in paper-making. Old ropes, flax and jute mill waste, old or torn pieces of paper of every kind, are all serviceable in paper-mills or in the manufacture of Millboard (q.v.). In the pulp of the latter old newspapers bulk largely. Cotton waste is much used by mechanical engineers for cleaning purposes. Sawdust (q.v.) is employed in several ways. Cork-cutter's waste has become of high importance in the manufacture of linoleum and cork-carpet (see FLOORCLOTH). From the bark stripped from osier wands the useful medicine salicin is now made. In days not so long past the spent madder of our large dyeworks was suddenly raised from a useless to a valuable material by treatment with sulphuric acid, which converted it into the dye called garancin. Madder itself, which till 1869 held a chief place among our dyestuffs, has since become of trifling importance, through the introduction of artificial Alizarin (q.v.). This is hardly the place to refer to the utilisation of Peat (q.v.), but it may be remarked that this material, so abundant in Ireland and Scotland, is in Russia, Germany, and Holland turned to profitable account in several ways, by methods which have not yet succeeded in Britain. From the seaweed thrown up on our shores iodine is obtained, but, although some is also used as manure, much of it is allowed to decay (see KELP). It is to be hoped, therefore, that the Algin (q.v.) which has been prepared from it will become a marketable product.

One of the most interesting examples of what has been done in converting a waste animal product into a highly useful material is seen in the case of waste-silk. Cocoons do not yield half their weight of reeled silk, but the remaining 'waste' portion has, through the ingenuity of an English inventor, become the raw material for a large spun-silk industry (see SILK). In Venice artificial flowers for ladies' head-dresses are made of imperfect cocoons. The various kinds of waste from woollen mills and from the cutting up of woollen fabrics are either worked up again into yarn or felt, or are ground into flock for paper-hangings (see SHODDY, and WALL-PAPER). Glue (q.v.) is made from parings of hide and from bone. The turnings and dust of the ivory and bone turner have various useful applications. Prussiate of potash (see FERROCYANOGEN) is made from almost any waste animal matter, such as parings of horns and hoofs, hair, blood, leather-cuttings, and even field-mice.

Wasting Palsy is one of the terms applied to the disease described at LOCOMOTOR ATAXIA. See also PARALYSIS.

Wast Water, in the Lake District (q.v.), Cumberland, 14 miles SSW. of Keswick, is a lake 3 miles long, ½ mile wide, 204 feet above sea-level, and in places 270 feet deep.

Watch. See HOROLOGY.

Watch, on Shipboard, a division of the crew into two—or if it be a large crew into three—sections, that one set of men may have charge of the vessel while the others rest. The day and night are divided into watches of four hours each, except the period from 4 to 8 P.M., which is divided into two *dog-watches* of two hours' duration each. The object of the dog-watches is to prevent the same men being always on duty at the same hours.

Watch-night. See NEW YEAR.

Water. In a state of purity, at ordinary temperatures, water is a clear transparent liquid, perfectly neutral in its reaction, and devoid of taste or smell. Its chemical constitution, indicated by the formula H_2O (molec. wt. = 17·96), is 2 parts of hydrogen to 15·96 parts of oxygen by weight, or very nearly two volumes of hydrogen to one

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volume of oxygen, which upon combustion form by their combination two volumes of water-vapour. The specific density of water at 4° C. is taken as the standard, and is reckoned equal to unity, or for some technological purposes as 1000. Water is used in the metric system as the means of connecting the measures of length and those of mass: a cubic decimetre measures a litre, and a litre of water at 4° weighs a kilogramme. Similarly the Gallon (q.v.) is ten avoirdupois pounds of water. The specific density of steam, reckoned (ideally) at 0° C., is 0·6235 (air = 1) or 0·0008063 (water at 4° = 1); that of ice is 0·94. If water be cooled to 0° C. (32° F.), it freezes if it be maintained at or below that temperature; it *may* be cooled even to − 10° C. (14° F.), if it be free from air-bubbles and kept very steady, without solidifying; it then has a sp. gr. of 0·998145; at − 5° C. it has a sp. gr. of 0·999118. If a block of ice at say − 10° C. (14° F.) be heated, its temperature first rises until 0° C. (32° F.) is reached; its specific heat during this stage is 0·502°; when it reaches 0° C. the ice begins to melt, but the temperature becomes stationary, remaining at 0° C. until all the ice has been melted. This takes place when 80·025 gramme-calories of heat per gramme have been absorbed; the latent heat of water is thus said to be 80·025. The water at 0° C. occupies less volume than the ice in the ratio of 94 to 100 nearly. At 0° C. the sp. gr. of water is 0·999871. As the heating is continued the temperature rises; the specific heat in this stage is 1, water being the standard substance for the measurement of specific heat; at 4° C. (39·2° F.) the sp. gr. is 1·000, water being then at its maximum density. There is thus a shrinkage in bulk between 0° C. and 4° C.; but as the heating is continued the water begins to expand, the specific heat slightly increasing; at 10° C. (50° F.) the sp. gr. is 0·999747; at 50° C. (122° F.) it is 0·9882; and at 100° C. (212° F.) it is 0·95865; thus 1 volume of water at 4° C. becomes 1·043 volumes of water at 100° C. As the heating is continued the water begins to boil: the temperature remains constant, apart from irregularities induced by superheating and consequent explosive bubble-formation and the presence of impurities (see BOILING-POINT): this goes on until the whole is converted into steam. Heat is absorbed in this operation equal to 536·5 gramme-calories per gramme. This steam has a temperature of 100° C.; its specific density will therefore be (273 ÷ 373) × 0·0008063 = ·00059014, and it will occupy 1694·5 times the bulk of the water at 4° C. If the steam be still further heated, it expands or exerts pressure like an ordinary gas: its specific heat is 0·4805 at constant pressure, 0·2989 at constant volume. If water be heated in closed vessels beyond 100° C., it exerts great pressure on account of its own expansion and its tendency to form steam; but it has been inferred from the variations in the latent heat of evaporation of steam at different temperatures that, if water could be exposed to a temperature of 720·6° C. without bursting the containing vessel, it would present the phenomena of the critical state (see GASES).

Water dissolves a great many substances, forming aqueous solutions. Its solvent powers for solids and liquids are in general increased by heat, while those for gases are diminished. When water is superheated (above 100° C., under pressure) it can even decompose some silicates such as plate and crown glass and extract the alkali, leaving silica. The following proportions by volume of the respective gases are soluble in water under a pressure of 76 cm. mercury column at 0° C. (32° F.) and 20° C. (68° F.) respectively: hydrogen, 0·0193 and 0·0193; nitrogen, 0·02035 and 0·01403; atmospheric air, 0·02471 and 0·01704; carbonic oxide, 0·0329 and 0·02312; oxygen, 0·04114 and 0·02838; carbonic acid, 1·7987 and 0·9014; sulphuretted hydrogen, 4·3706 and 2·9053; sulphurous acid, 79·789 and 39·374; ammonia, 1049·6 and 654·0. In some cases there is heat evolved when the gases dissolve. Hydrochloric acid evolves heat, but this is not a case of simple solution; there is some chemical combination; the gas and the water do not part company when heat is applied, but gas or water is given off until the solution attains a particular strength, after which it distils bodily. Some liquids dissolve in water by a process of interdiffusion; and salts dissolve each in its own proportion, which varies with the temperature. Heat is often evolved by the act of solution if there be chemical combination between the salt and the water with formation of *hydrates;* but if there be no such union, then the absorption of heat in liquefying the salt results in cooling. These two effects may more or less completely balance one another. Water may combine with an anhydrous acid, playing the part of a base and forming a salt of hydrogen, with evolution of heat: thus $SO_3 + H_2O = H_2SO_4$, sulphuric acid or hydrogen sulphate, analogous to K_2SO_4, potassium sulphate. Similarly it may combine with an anhydrous base, forming a hydrate: $K_2O + H_2O = 2KHO$. In these cases the water cannot, in general, be expelled by simple heating. When it combines with salts, being taken up by them in the act of crystallising, it is in many cases essential to the form of the crystal, but can be expelled by heating; the crystal in that event crumbling into powder: and such water contained in a crystal is called *water of crystallisation.* Beyond this there is often some *water of constitution* present: if the attempt be made to drive this off by continued or higher heating, the salt is decomposed. Crystals of sulphate of iron, $FeSO_4,H_2O + 6H_2O$, illustrate this; on gentle heating, the water of crystallisation is driven off and $FeSO_4,H_2O$ is left: if this be further heated it is decomposed (see SULPHURIC ACID).

Water is very slightly compressible: a pressure of 1 dyne per sq. cm. causes a reduction in volume of 1–20,700,000,000th; a pressure of one atmosphere (1033·3 dynes per sq. cm.) one of 1–20,033d. For many practical purposes, therefore, water may be regarded as incompressible. In the liquid state it is colourless in small quantities, blue-green in large masses, and blue in still larger masses: and it has a refractive index of 1·3324 for the sodium line D at 15° C. In the form of ice its crystals have forms derived from the rhombohedron and six-sided prism, and are doubly refracting, with an index of 1·3060 for the ordinary and 1·3073 for the extraordinary ray (red light). Water-vapour has a refractive index (Mascart) of 1·000257. Water is slightly diamagnetic, and in the pure state has no electric conductivity. The least trace of substance in solution confers electric conductivity upon it; and then, when a currrent is passed through it, it is decomposed or *electrolysed,* hydrogen being set free at the negative electrode as if it travelled with the current, and oxygen at the positive electrode (against). Water-vapour may be decomposed by a very high temperature; and this limits the temperature attainable in the oxyhydrogen flame, for the combination of oxygen and hydrogen is arrested when a certain temperature has been reached. Water-vapour is readily decomposed by oxidisable substances, such as glowing iron or coke; but the heat must be kept up in order to supply sufficient energy for the decomposition of the water-vapour. In the former case the products are hydrogen and magnetic oxide of iron; in the latter, water-gas. But if hydrogen is passed over glowing oxide of iron or copper, the oxide is reduced to metal, and water-vapour is formed.

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Absolutely pure water is not to be found in nature, since water always finds something to dissolve even as it falls through the air in the form of rain: rain-water contains not only atmospheric air (2½ vols. per hundred), but also some ammonia and carbonic acid and traces of nitrates, together with salts derived from dust. The principal tests to which water is subjected in order to determine its impurities are examination of colour, taste, smell after being shaken up; analysis of the residue left after evaporation, for silica, iron, alumina, lime, and magnesia; acidifying with hydrochloric acid, and estimating the sulphuric acid by means of barium chloride; determination of the chlorine present; estimation of nitrates and nitrites (these being of importance as indicating oxidised organic matter and showing that the water had passed through organic matter); determination of the free ammonia and of the total amount of ammonia producible by reductive processes from the organic matter present in the water (albuminoid ammonia); estimation of the carbonic acid. The hardness of water is determined by making a solution of soap of such a strength that a standard volume of it will take a given quantity of barium chloride, and then be just able to froth on shaking. This standard soap-solution is then dropped into a measured quantity of the water to be tested, which is shaken after each addition, until frothing begins: from the quantity of soap-solution used, with the aid of a table (for the quantity of lime or magnesia salts present and the quantity of soap-solution used are not directly proportional to one another), the total hardness—i.e. the quantity of lime salts present, which curdle and waste soap by forming insoluble lime-soap—is determined. In another sample the carbonates of lime and magnesia are removed by boiling, and the above test then applied after cooling: this determines the 'permanent hardness,' due to sulphates of lime and magnesia. In both cases control experiments are made by removing the lime and magnesia by means of oxalate of ammonia, and then testing with soap. The results are expressed in 'degrees of hardness,' which in England mean grains of $CaCO_3$ (or their equivalent in magnesia carbonate, or in sulphates of lime or magnesia) per gallon, in France centigrammes $CaCO_3$ per litre, and in Germany centigrammes CaO (or its equivalent in MgO) per litre.

The question as to who was the discoverer of the composition of water—the great Water Question—takes rank in the history of chemistry as the controversy as to the discovery of the calculus and of the planet Neptune in other sciences. Brougham, Brewster, Kopp, Arago, Dumas, and many others have maintained one or another of the theses; and the claims of Cavendish, James Watt, Priestley, and Lavoisier have been canvassed and defended. Research seems inclined to give the priority to Cavendish, while allowing that Watt made independent experiments and came to similar results soon after.

See Dr George Wilson's *Life of Cavendish* (1846); Muirhead's *Watt* (1854); and Thorpe at the British Association in 1890. See also articles on Sea, Mineral Waters; and on Boiling-point, Electricity, Evaporation, Freezing, Gas and Gases, Gas-lighting (for water-gas), Heat, Hydrogen, Ice, Magnetism, Melting-point, Metre, Oxygen, Refraction, Snow, Solution, Specific Density, Steam. For Water on the Brain (or in the Head), see HYDROCEPHALUS.

WATER-POWER.—Strictly speaking, says Professor Unwin, there is no such thing as water-power. The term is convenient but inaccurate; for whether the water descends on a water-wheel or actuates a pressure-engine, it is merely an agent of transmission, and water-motors might with more scientific precision be designated gravity-motors. The term water-power is, however, a convenient one, and is universally understood and accepted. The primary source of water-power is the evaporation of liquid water by the solar heat from the earth's surface and the sea. The vapour thus formed condenses in the upper and colder regions of the atmosphere, and falling as rain flows as streams from a higher to a lower level, exerting in such descent an amount of energy proportional to its weight and volume. By suitable mechanical appliances a portion of this energy can be utilised for industrial and economic purposes. The science and practice of collecting, storing, distributing, and beneficially employing the rainfall of a district constitutes an important branch of engineering.

The utilisation of water-power by means of mechanical contrivances dates far back into the world's history. The ancients appear to have fully appreciated the advantages of the water-wheel, though they used it chiefly for the purpose of raising water for irrigation. The Egyptian wheel may still be seen on the Nile; and similarly on the Euphrates, &c. the original form and use of the water-wheel are retained. Notably amongst eastern nations the Chinese were conversant with water-motors from a very early period. The first attempts to produce hydraulic machinery proper, as the term is now understood, were in the Greek schools at Alexandria which flourished under the Ptolemies, under whose regime Ctesibius and Hero (q.v.) invented the fountain of compression, the siphon, and the force-pump about 120 B.C.

Water-power engines are divisible into five sections, and are classified by Professor Rankine as follows: (1) Water-bucket engines, in which water poured into suspended buckets causes them to descend vertically, and so to lift loads or overcome other resistance, as in certain hydraulic hoists. (2) Water-pressure engines, in which water by its pressure drives a piston. (3) Vertical water-wheels, being wheels rotating in a vertical plane and driven by the weight and impulse of water. These are the most common of all water-power engines. (4) Horizontal water-wheels or turbines, being wheels rotating in a horizontal plane, and driven by the pressure and impulse of water. (5) Rams and jet-pumps, in which the impulse of one mass of fluid is used to drive another. The action of the water may be distinguished as taking place in three ways —(*a*) by weight, (*b*) by pressure, (*c*) by impulse.

I. Water-bucket engines constitute an exceedingly simple type of contrivance for utilising directly the weight of water. Buckets filled with water at a high level discharge themselves on descent to a lower one, having dragged up passengers, merchandise, &c. Power is, and has been for centuries, similarly obtained for stamping, threshing, and kindred purposes in primitive districts where water is abundant and rude appliances alone procurable.

II. Water-pressure engines may be either single or double acting. Fig. 1. represents a reciprocatory hydraulic engine, whose action is similar in principle to that of the ordinary non-condensing steam-engine. The water under pressure is admitted at one end of a cylinder *a*, the escape valve *d* at the same end being simultaneously closed, and the corresponding valve on the other side opened. In this manner the alternating action of valves and piston is continuous. For smooth and effective work the piston area should be large and the speed slow. For mining and kindred operations, where water-power is available and fuel scarce, pumping, hauling, &c. is largely and advantageously performed by such engines. In towns where sufficient pressure can be obtained from the mains, engines of this class are useful for furnishing small power. Under circumstances where steam-power is inconvenient or

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unsafe, as in mines, docks, &c., hydraulic-power is extensively adopted. Hydraulic presses, cranes, hoists, &c. are largely employed, generally in connection with an accumulator.

III. Vertical water-wheels may be divided into three classes, and are thus described by Sir William

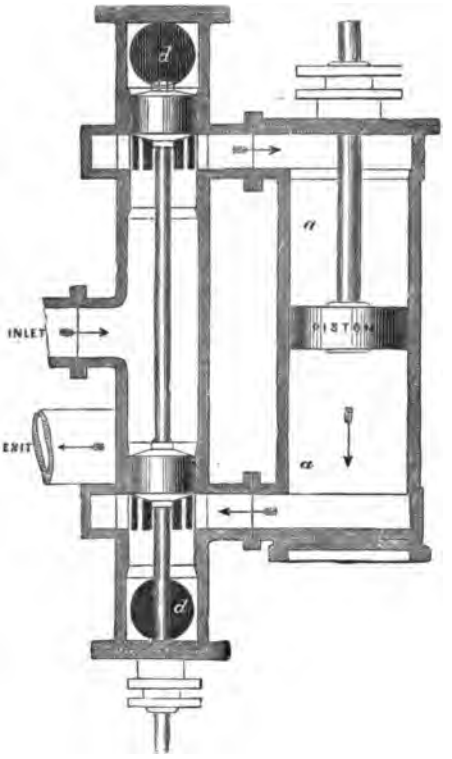

Fig. 1.

Fairbairn—(*a*) Overshot wheels, where the water is applied over the crest or near the upper extremity of the vertical diameter; (*b*) Breast-wheels, where the water is applied below the crest at the side of the wheel; (*c*) Undershot wheels, where the water is applied near the bottom of the wheel and acts (1) by gravitation as in the improved undershot wheel, or (2) by impulse as in the ordinary undershot and Poncelet wheels. With falls varying from 10 to 70 feet, and supplying from 3 to 25 cubic feet of water per second, a wheel may be constructed on which the water acts chiefly by its weight. If the

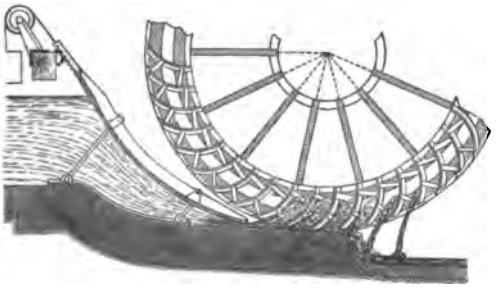

Fig. 2.—Poncelet Water-wheel.

variation of head-water does not exceed 2 feet, an overshot wheel may be used. With greater variation of head-water level, a pitch-back or high breast-wheel is better. When the fall does not exceed 6 feet the best water-motor to adopt in many cases is the undershot wheel with curved palettes invented by General Poncelet (1824). The ordinary undershot wheel develops only about 25 per cent. of the work of the water, whereas the Poncelet wheel utilises 60 per cent. of such work. The principle of this wheel, much used in France, lies in the water being received by the curved floats without any shock and finally discharged with a small velocity.

IV. Horizontal water-wheels or turbines are water-wheels with vertical axes, receiving and discharging water in various directions round their circumference. Fig. 3 represents in plan a reaction wheel. The water on admission from below passes upwards through the passages *a*, *a*, and escaping by tangential orifices, *b*, *b*, at the circumference —as indicated by the arrows traversing them—produces a reactionary motion of the wheel in the direction of the arrow *c*. The earliest form, known as Barker's Mill (q.v.), discharged water from straight tubular arms projecting from a hollow shaft. Fourneyron perceived that for water to leave the wheel without waste of energy, it must receive some initial forward velocity before entering, and his introduction of guide blades for this purpose formed the main feature of his important invention. Turbines are divisible into three classes, according to the direction in which the water moves before reaching the guide blades, and after leaving the wheel—viz. (1), parallel, (2) outward, and (3) inward flow turbines. Professor Unwin considers that 80 per cent. may be taken as the maximum efficiency of the best turbines in normal conditions of working. Turbines are extensively used, and the different types and modifications obtaining are very numerous.

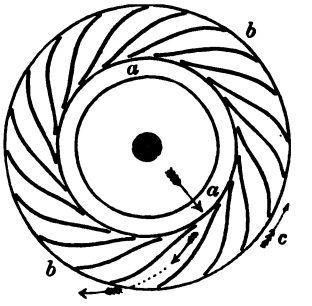

Fig. 3.

V. Two other classes of machine fall to be noticed —(*a*) Those in which the energy of a mass of liquid descending from a small height raises a small portion of that liquid to a greater height as in Montgolfier's hydraulic ram; and (*b*) those in which a stream of fluid moving at first with a certain velocity drives and carries along with it an additional stream, the two streams finally mingling together and moving with a velocity less than that of the driving stream—as in the jet-pump, the water-blower, the blast-pipe, and the injector.

See ARCHIMEDES' SCREW, BARKER'S MILL, BLOWING-MACHINES, CRANE, HYDRAULIC PRESS, HYDRAULIC RAM, HYDRODYNAMICS, PUMPS, INJECTOR, IRON (p. 217), TIDES, TRANSMISSION OF POWER.

WATER-SUPPLY.—In old times kings and communities made artificial channels and conduits to convey good water in large quantities to important towns. Hezekiah made a pool and a conduit and brought water into the city; and the remains of Roman aqueducts in the Campagna; near Nîmes; and in many parts of the world give evidence that water-supply was well cared for in past ages (see AQUEDUCTS). The fact that water would, in an inverted Siphon (q.v.), stand at the same level in both legs, must have been observed; and it could not have been from ignorance of this circumstance that water was not conveyed across deep valleys by means of siphons. Indeed it appears

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that in the time of the Emperor Claudius there was constructed a conduit 13 leagues in length to supply a palace near Lyons; it traversed eight valleys by means of aqueducts, but in the case of the ninth valley the water was conveyed across by an inverted siphon, consisting of nine lines of leaden pipes, each pipe being 8 inches diameter and 1 inch thick. No doubt, therefore, it was the want of any such material as cast-iron for large pipes, and the consequent necessity of multiplying small pipes (small, to resist the pressure) in lead or in wood, that caused the hydraulic engineer of those days to prefer the grand masonry aqueducts.

Sources of Supply.—These sources all owe their being to that great heat-engine the sun, which vaporises the waters of the sea and produces the currents of air that convey these vapours to the land, where they are condensed into mist or rain or dew, and are gathered from little rills and streamlets into rivers, falling eventually into the ocean, with or without the intermediate receptacle, the lake; or, on higher grounds and in colder regions, fall as snow. Not only does the sun raise vapour from the waters of the ocean, but also from the surface of lakes and rivers, and from the moist earth and its vegetation, and even from the surface of ice, and does so without bringing that ice into the liquid condition. When the nature of the soil is favourable, a very large portion of the rainfall sinks in and traverses below by percolation, or in fissures, producing *Springs* (see SPRING); or else it continues its concealed course the whole way to the sea, or to some river, and is delivered sometimes above the sea-level, sometimes below it, so that in places fresh water can be gathered from among the shingle directly the ebbing tide has removed the cover of salt water. Under all circumstances the cycle—of evaporation, transport of vapour, condensation, and return to the liquid state, to be again evaporated—goes on, and thus, in the words of the Wise Man, 'All the rivers run into the sea, yet the sea is not full; unto the place from whence the rivers come thither they return again.' Springs may be found in proximity to a population, and issuing at a sufficient height to supply that town by gravitation. But more commonly springs issue at levels not sufficiently elevated to directly supply a town, and then recourse must be had to pumping. In mountainous countries it is quite possible to find *streams* near towns at such elevations as to admit of a supply by gravitation; and for towns more remote, it is a mere matter of engineering to convey the waters of such streams by means of aqueducts and pipes, so that the pressure (less the loss needed for 'head' to produce the flow) shall be maintained, and the distant town shall still be supplied by gravitation. In a plain country, far removed from an elevated supply, the best plan may be to pump from the neighbouring river. *Wells* in almost all cases demand the use of pumping-power. For even in true Artesian Wells (q.v.), those which overflow, it is rare that the mouth of the well is at such a level as to enable a supply to be given by mere gravitation. The spring and the river are natural supplies; the well is a product of art; the lake may be natural or be the *artificial lake*, which stores the rainfall from a gathering ground.

Quality of the Water.—That from springs may be of almost any character. It may be saline or ferruginous—in fact it may hold in solution any number of chemicals (see the analyses of renowned spas); it may be clear, bright, and palatable; or may resemble weak chicken-broth, flavoured with rotten eggs. It may give forth volumes of the carbonic acid with which we artificially impregnate waters for potable purposes; or it may be accompanied by torrents of foul sulphuretted hydrogen. Having regard to the great solvent power of water, and to the variety of materials among which subterranean water passes, and to the time it is in contact with these, it is not surprising that when it comes to the surface it should contain some of these various matters in solution. But the water of such springs as are used for water-works purposes is generally clear and bright, acceptable to the palate, and frequently 'hard.' So commonly is deep well water. Not only is there provided a natural means for the aeration of spring and well-waters; but this aeration burns up the organic matter brought down from the surface. It is extremely instructive to notice how a pervious soil—a chalk soil, for example—'breathes,' taking in and expelling air and gases. The breathing, it is true, is long-drawn and irregular, as it depends mainly, if not entirely, on the variation in the barometer. This breathing may readily be observed by closing the folding-doors over a chalk well and applying a lighted candle to the bucket-rope hole, when there will be found an indraught or an outdraught, as the case may be, varying in intensity according to the suddenness and extent of the recent barometrical change. But, though as a general rule springs and deep wells may be relied on to produce water uncontaminated by any matter detrimental to health, there are cases where such waters have been defiled, and are not sufficiently purified by the aeration above mentioned.

A river-supply will be influenced by the character of the gathering-ground, by the amount of spring-water which makes its way into it, and by the condition of the districts through which it passes. The quality of the supply for an impounding reservoir depends on the purity of the gathering area, on its freedom from cultivation, and on the presence or absence of peat.

Filtration, &c.—Waters which in their state of crude supply would not be potable may be rendered perfectly so, and in fact may be distributed in a condition which makes them superior to other waters deemed sufficiently good to be used without any treatment at all. Deposition and filtration will render water that is cloudy, owing to suspended matter, perfectly bright and clear, and it is now well established that filtration has a most important effect in the removal of germs. If possible river-water is not taken even into a depositing reservoir during times of excessive flood; but when received it is allowed to remain until the coarser particles have subsided. It is then drawn off, or more commonly has to be pumped from the depositing reservoir on to the filter-beds. A filter-bed is usually thus constructed: A water-tight tank is provided of some 12 feet deep, and of such area as may be determined upon—an acre is not unusual for large works; the bottom of the tank is formed with a slight fall from all directions towards a draw-off outlet. On the floor of the tank very coarse materials, such as rubble-stone, or irregular lumps of brick from the kiln, are arranged so that while presenting a surface to support that which is put upon them, they afford by their interstices a free flow towards the outlet. On this rough material is laid coarse shingle, then finer, then gravel, and finally sand. The whole thickness from the top of the coarse material to the top of the sand may vary from 2 to 4 feet. The water to be filtered is maintained on the sand-surface to a depth probably of 4 feet, more or less, while the outlet (the filtered water) is held up by adjustable means so as to give such a difference between the level of the water on the filter-bed and that of the outlet as will provide the 'head' needed to cause the water to traverse the sand at the desired rate. This rate varies very considerably, say from

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forty to eighty gallons per superficial foot in twenty-four hours; a very fair rate is fifty gallons.

It is advisable in the neighbourhood of towns to cover the reservoirs in which the filtered water is stored. A most useful adjunct to filtration, the invention of Dr William Anderson, has been adopted in certain cases where the source of supply has not been satisfactory. This invention consists in causing the water on its way to the filter-bed to pass through a large slowly-revolving cylinder charged with scraps of metallic iron. The action suggested is that the water on entering the cylinder attacks the metallic iron and forms ferrous oxide at the expense of a portion of the dissolved oxygen; after leaving the cylinder the water regains the oxygen it had lost, and the ferrous oxide is oxidised to ferric oxide. It seems probable that while a small proportion of the organic matter is attacked chemically, the chief action is mechanical and consists in the formation of an insoluble, bulky precipitate, consequent co-precipitation of organic matter, and better filtration through the film of oxide deposited on the sand of the filters. These iron purifiers have been adopted in the United States, in India, on the Continent, and for the Worcester water-supply. Their earliest employment on a commercial scale was in 1881 for the Antwerp Water-works, where the extremely unfavourable crude water of the river Nethe has been successfully transformed into an excellent potable water.

The quantity that can properly be filtered per foot super. per twenty-four hours being known, it is easy to determine what size and number of filters will be needed in work for any given supply—e.g. at fifty gallons per foot 20,000 superficial feet, or roughly, half an acre, would be required for one million gallons per day. But there must be in addition one or more filters, which shall be out of use for the purposes of cleaning. This cleaning consists in taking off the upper part of the sand, washing it thoroughly with filtered water, and restoring the cleaned sand to its place.

Softening.—Well-water and spring-water, if hard, generally contain in solution magnesia or carbonate of lime, or both. The carbonate of lime-water can be softened by Dr Clark's process, as follows. Ordinary quicklime is agitated with already softened water; by a mechanical stirrer, or by blowing in air. After the agitation the water is allowed to settle, resulting in the production of a perfectly clear water containing dissolved (not suspended) lime. A certain quantity of this lime-water—a quantity varying with the nature of the water to be softened, but very commonly $\frac{1}{4}$ of the hard water, or $\frac{1}{5}$ of the whole—is then allowed to run into the softening tank, the water to be softened is delivered into this same tank, and so as to mix with the lime-water. On the mixing of these two clear fluids they immediately become milky. The explanation of the process given by the chemists of the present day is that the carbonate of lime is soluble in water, because the water contains free carbonic acid, and that the addition of the quicklime absorbs this carbonic acid, making the quicklime into a carbonate, and rendering the water incapable of continuing in solution the carbonate of lime it originally contained, or of dissolving the newly-formed carbonate of lime. When the softening reservoir has been filled the water is allowed to stand until, the whole of the carbonate of lime having settled at the bottom, the water remains perfectly bright and clear. This is then drawn off by a hinged draw-off suction-pipe having a floating end which takes the water at about a foot below the surface, and falls as the water is pumped away. As soon as the suction-pipe approaches the sediment in the bottom the drawing-off is stopped, and the softening tank is re-charged for another operation. From six to twelve hours is a sufficient time to allow for the settling. By this process water of 17 to 20 degrees of hardness is readily reduced to a hardness of from 3 to 4 degrees.

Hard and Soft Water.—It is now generally recognised that on the score of health there is nothing to choose between these. Hard water is brisker and more agreeable to the taste, and has a better colour and appearance than soft water as derived from ordinary impounding reservoirs. For general manufacturing purposes the advantage is with the soft water.

A difficulty attending the use of an extremely soft water is its power of attacking the leaden service-pipes and of causing lead-poisoning (see Vol. VI. p. 545). One of the sources of supply to Sheffield gave considerable trouble on this score, but the difficulty has been overcome by the addition of powdered chalk to the extent of from $\frac{1}{2}$ a grain to (rarely) 3 grains per gallon. To set against this defect of soft water, it is alleged that the use of hard water wastes soap. It does seem a matter of regret that the processes of filtration, &c., so needful for the potable and culinary water, should be applied equally to the water which flushes a water-closet, or waters a road, or is used in scouring a floor. A dual supply would be the cure for this, and would also enable small but select sources of water to be distributed through a town in ample quantity for drinking and cooking, while a less good source might serve for coarser purposes.

Distribution.—The object is delivery into every house, and, within reason, to the top story of the houses; and also to provide such a pressure as will give efficient jets of water for fire extinction. Assume, that, either by gravitation or by pumping, the necessary pressure is obtained, the engineer then has to consider his system of distributing mains. These will vary in size from the large arterial mains supplying whole districts down through the lesser diameters supplying groups of streets, or a single street, to the small service-pipe which conveys the water to a single dwelling.

As to the flow of water through pipes, the 'heads' producing the flow being equal in two cases, and the lengths of the pipes being equal, the quantity delivered in a given time will vary as the square roots of the fifth powers of the diameters. That is, if a pipe of a diameter of 1, and of a length of 1, will, under a head of 1, in a time of 1, deliver a quantity of 1, then a pipe of a diameter of 2 will, all other things being equal, deliver a quantity of $\sqrt{2^5} = \sqrt{32} = 5{\cdot}656$ times the quantity.

There are two systems on which water is supplied to dwellings and to districts—viz. the intermittent and the constant, and each of these systems has its advantages and its disadvantages. The intermittent, carried out to its full extent, is a system wherein the water is turned on to a district say for two hours out of the twenty-four, or for a time that is sufficient to fill the receptacles with which on the intermittent system all the houses are provided. In this manner, notwithstanding that the actual expenditure of water within the houses varies most materially according to the hours of the day, the demand on any set of mains can by turning on district after district be kept practically constant, and thus a more uniform pressure can be maintained. Moreover, a low district is prevented from taking away the water from a higher district. The objections to this arrangement are the wages expense of the turncocks, and the chance that in the event of fire there may be delay in turning the water into the district mains. Further, the water

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must be received into cisterns, which are too commonly neglected and suffered to become foul.

On the constant system the cistern may be dispensed with altogether, and the water be obtained direct from a tap on the service-pipe. The objections are that water may be wasted by the careless leaving open of a tap, the possibility of the consumer's being left without a supply if a main burst, and the heavy draught on the mains at certain hours, and the consequent reduction of pressure, to the prejudice of the higher districts. When using constant service and where there are considerable differences of elevation in a town, it is expedient to divide the system of distribution into zones of level. Probably the best mode of domestic supply is that where constancy is combined with storage, the potable and culinary water, however, being obtained by direct draught from the service-pipe, and not from the storage-cistern.

Quantity required per Head.—A town supply may be divided into three distinct provisions—that used for domestic purposes proper;. that used for municipal purposes, such as road-watering and drain-flushing; and that used for trades. When the supply is computed to allow for all purposes, it is clear the quantity must vary greatly in different towns. In manufacturing districts, where industries are carried on involving the use of water for washing and for dyeing, the water, if of suitable quality and obtainable at a low rate, will be very plentifully used, and so the quantity per head per diem will be largely increased. On the other hand, for domestic and such municipal purposes as road-watering and drain-flushing, it is found that an average of 25 gallons per head per day is ample, even when considering the needs of a strictly water-closet town, and with a liberal allowance of fixed baths and of hot-water apparatus. There are instances in the United Kingdom where it is said 50 to 60 gallons per head per day are used, but investigation would show, that although a quantity equivalent to this rate per head per day may be delivered into the distributing mains, it is never *used*—in fact, could not be *used* by the population. When in a non-manufacturing town such quantities as these are passed into the mains they never come into the possession of the householder, but escape, to a slight extent by leakage in the mains and services, or are wasted owing to improper fittings in the houses, or through the fittings being misused, or badly maintained.

Waste-prevention.—That this excessive quantity of water never comes even to the knowledge of the householder has been fully demonstrated by the use in numerous cases of an implement designed (about 1870) to detect the waste, and to prevent its continuance. This implement, the invention of Mr G. F. Deacon, for many years engineer of the Liverpool Corporation, consists of a meter through which the supply of a district, containing say some 200 houses, is passed. The meter is so constructed that the water in flowing through presses on a metallic disc, suspended by a counter-weighted wire, and capable of moving up and down in a vertical truncated cone. The parts are so proportioned that the height of the disc in the truncated cone is an index of the quantity flowing per hour. By means of a pencil attached to the wire, this height is automatically marked on a paper wound around a drum which revolves, by clockwork, once in twenty-four hours; the paper is ruled with vertical lines representing time, and with horizontal lines representing the rate of flow in gallons per hour. It is therefore easy to determine at a glance what has been the rate of delivery at all times during the twenty-four hours, and also by computing the area of the space bounded by the pencil line, to determine the actual quantity in any given time. In a district demanding nothing but a purely domestic supply it is to be expected that the requirements from midnight to say 5 A.M. should be practically nil, while between 6 A.M. and 10 or 11 A.M. the maximum should be reached. If therefore, on examining the curve drawn on the paper, it appear that during the hours shortly after midnight the passage of water through the meter was but small and that the increased flow shown in the morning hours, and at the other hours when meals are being prepared, was relatively large, then it may be fairly assumed that all is in order. If, however, the paper reveal that in the hours closely following midnight there was a delivery so large that the increased quantity of the maximum hours formed but a small percentage of the quantity passing during the night hours, then it may safely be assumed that there is great waste going on. On this being observed the district is perambulated at night, and the socket spanner, with which the stopcocks external to the consumers' premises are worked, is applied to all the houses in succession, and is used as a stethoscope to ascertain by the sound whether or not water is flowing into the house; if it be heard to do so, the cock is shut, and the time is noted. This course is pursued throughout the district; very probably not more than five or ten per cent of the houses will have given evidence of waste; but on revisiting the meter it will be found that at the times corresponding with those in which the cocks were shut there was an instant decrease in the rate of flow, and that the whole rate has now fallen to that which is permissible during the night hours. On inspecting next day the houses which had been shut off, it will commonly be discovered that there was not any ball-tap to the cistern, or that there was a burst service-pipe across the courtyard below the surface, or that there was some other source of waste. That this is sheer waste, of no use to the occupier, is made clear by the consideration—that the delivery of water is going on in the dead of the night, when he is utterly unconscious of the fact, and although it goes on the whole twenty-four hours round, the occupier is, during his waking hours, equally unconscious of it, and makes no use of the water. If a slight house-waste only be going on, and the stopcocks be closed, and if it be found on returning to the meter that the heavy night flow is continuing, then the water authority must proceed at once to make an inspection of its own pipes, to find out where the leak is taking place. Thus the waste-water meter is of service to detect waste in the pipes external to the houses, to detect waste within the houses themselves, and also to show the quantity of water really *used* within the houses.

Not only does the waste of water involve extended outlay in the water-works, and the appropriation of gathering-ground which may be sorely needed by a neighbouring town, but it involves renewing the distributing system with larger mains to prevent the excessive loss of pressure which arises from the demand for increased quantities. This loss of pressure both precludes the possibility of playing a useful jet from a hydrant for the extinguishment of fires, and also prevents the water from rising to a reasonable height in the houses.

Where the water authority dare not (for fear of its constituents) establish and enforce proper regulations as to the nature of the fittings, and as to their condition and fair usage, the waste becomes something appalling. The Return (1891) of the Philadelphia Bureau of Water shows that 71 American gallons (equal say to 59 English gallons) were delivered in 1881 per head of the population per diem; but this quantity, excessive as it was, increased steadily year by year, and in 1890 was 132 American (110 English) gallons.

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Some of those who look approvingly on the large delivery of water allege that at all events it is of benefit to the drains. This is a mistake; the water from a uniform leak of many gallons per hour has no power to act as a flush; but this large delivery of water has an effect on the sewerage, and one of a most disastrous character—viz. that the volume is so much increased as to materially add to the difficulty of disposing of the sewage either on land or by precipitation, while it also adds to the first cost and to the annual cost of pumping, where pumping is necessary.

When good supervision is exercised to prevent waste, from 16 to 20 gallons per head per day is all that is needed. Allowing for road-watering and drain-flushing, a fair estimate in a non-manufacturing town is, as already stated, 25 gallons per head per diem, even when taking baths into account, for with respect to these it must be remembered that some 20 per cent. of the population are of seven years of age or under, and that in their case the hip-bath or the tub is better than a large bath. Records have been kept which show that 2 gallons per head per diem is an outside allowance for potable and culinary water. The allowance on board ship to emigrants is fixed at 3 quarts per head per diem, and 10 gallons per mess of 100 for cooking, or in all less than one gallon per day per head. A very small surface would supply sufficient water—even with the rainfall of London—if all that fell on that surface could be collected, to prevent a man dying from thirst. A full-size umbrella, with an area of about 9 sq. feet, will do this. Taking the London rainfall at 25 inches, this makes 18¾ cubic feet, or 117 gallons = between $\frac{1}{10}$ and $\frac{1}{8}$ of a gallon per diem.

Selection of a Source.—When the average daily quantity of water needed, allowing for increase of population twenty to forty years ahead, has been determined, it then becomes necessary to see how it is to be obtained. If there be in the neighbourhood an adequate spring, or a river of satisfactory purity, the minimum daily flow of either of these is generally known, or can be approximately ascertained, and it will at once appear whether, taking into account other interests, the needed quantity can be drawn daily from the spring or from the stream. If, having regard to the geological character of the neighbourhood, it is deemed expedient the supply should be from deep wells, then there is generally evidence at hand as to the height at which the water stands at different seasons of the year and in different years in such wells, when pumping is not going on, and how much the level is lowered with different rates of pumping, and how far this pumping affects neighbouring wells. If the indications are satisfactory, trial borings are made, and the yield is tested. In some cases the supply afforded from one or more bore holes suffices; but frequently it is found necessary to sink a well, shutting out by means of cast-iron lining, or 'tubbing,' all surface-water, and when a sufficient depth is reached to drive adits—preferably at about right angles to the direction of flow of the underground water—so as to intersect the various fissures through which the water may be running. These adits may themselves be provided with bore holes.

There is a prevalent and mistaken notion that pumping from the chalk, in a chalk valley, in which there is a stream, must diminish, *pro tanto*, the quantity of water flowing in that stream. No doubt if the pumping were to take place at some point just above where the chalk spring gushes out to feed the river, this would be true; but, as a rule, the pumping does not take place in such a locality, but in situations where, when no pumping is going on, the water is many feet, not infrequently 60 feet, below the level of the water in the river. The fact that the water is at 60 feet below the river is proof that the abstraction of water at that point cannot influence the river; but what it does is this. It lowers the level of the water at the well, making a cone of depression for a certain distance round the well, and bringing to the surface and rendering useful that which otherwise would have passed away to the sea, invisibly and uselessly.

Where neither spring, river, nor well supply is available, and recourse must be had to gathering-grounds and impounding reservoirs, then arises the anxious question how near, and at what elevation can the needed area of gathering-ground be found? how much water will it yield during the year? are there many consecutive weeks or months during which the yield is but small? are there suitable sites for reservoirs and dams? and lastly, to what extent would the proposed works and abstraction of water interfere with existing interests? The difficulty of finding adequate and satisfactory gathering-grounds in the United Kingdom becomes more and more serious as suitable areas are taken up by one town after another. Mountainous or hilly gathering-grounds are, all other things being equal, to be preferred, because the rainfall is greater at high elevations, because the land is less suited for agricultural purposes, and because, even after allowing for the loss of head necessary to produce the flow through the conduit that extends from the reservoir to the town, the water can still be delivered into the service-reservoir at such an elevation as will supply the houses without pumping.

The engineer has also, in the United Kingdom, to allow for the water compensation to be given to the river fed by the gathering-ground. This compensation in the case of rivers in manufacturing districts is commonly fixed by parliament at ⅓ of the whole water to be obtained by the works, leaving ⅔ for the town; when the river passes through a mere rural district very much less compensation water is given. Whatever may be the quantity of the compensation water, it is always made a first (water) charge on the undertaking. This provision of storage and of compensation water is an advantage to the river, as by it heavy floods are prevented; and during those periods when for days or weeks together the natural flow of the river would be practically reduced to a mere rill, the compensation water affords a satisfactory and steady stream. Sometimes a separate reservoir is handed over to a committee of riparian proprietors, who regulate the outflow as they please. Sometimes the act prescribes that there shall be a continuous equable outflow day and night throughout the year; sometimes the compensation water must be given by an enlarged flow restricted to the working hours of working days; and sometimes the regular daily flow is reduced, so as to reserve water for periodical flushes of heavy delivery during the dry season. Bearing in mind the conjoined demands of the town and of the river, and knowing from rain-gauge observations the average rainfall on the gathering-ground, the engineer makes an allowance off this average for the diminution arising from three consecutive dry years; he next allows for loss by evaporation and absorption, and then treats the remainder as available for storage. Lastly he has to ascertain the irregularity from month to month in the rainfall, and he is then in a position to say how many days' storage the reservoirs should contain; these numbers of days vary very largely according to the character of the rainfall of the district.

Dams.—Having ascertained the extent of the storage needed, the hope of the engineer is that he may find among the hills on the course of the stream from the gathering-ground some valley not

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too steep, and having a contraction at its lower end, across which may be built a dam which will pen up in the valley the needed quantity of water. In the United Kingdom these dams have commonly been made by earthen embankments having faces of a very gradual slope, especially gradual on the outside and containing in the centre a wall of puddled clay carried down below the ground surface into 'the puddled trench' sunk into the substratum until a solid water-tight bed is reached. Some of these banks have been made of great height, as much as 120 to 140 feet above the surface. Elsewhere masonry dams have been employed to a considerable extent—as at Vyrnwy (q.v.) for the supply of Liverpool. In this case a masonry dam of 100 feet above the ground-level and 60 feet below ground has formed a lake containing 11,000 millions of gallons.

Charge for Water.—For trade purposes this is commonly done by meter. Meters may be divided into two great classes, the Inferential and the Positive. A typical inferential meter is one where the current of water in passing through the meter causes the rotation of a vane (like that of a smoke-jack), and experiment having shown what relation the revolutions of the vane bear to the quantity passed in that experiment, it is *inferred* that at all rates of delivery the revolutions and the quantity will vary together. There should not be any harmful loss of pressure in passing through such a meter. A typical instance of a positive meter is one wherein the water fills a vessel of known capacity, and is then automatically turned into a second vessel, which it fills while the first one is being discharged. Such a meter, when properly constructed, is indeed a positive meter, but it is obvious that the pressure with which the water is delivered is destroyed, and that thus such a meter could not be placed in the cellar, for example, with the intention that the water which it had measured should be sent to the top story of the house, or indeed to any higher point. Another kind of positive meter is one wherein a piston is caused by the water to traverse in a cylinder, and to change its direction of motion when the cylinder is full, thus recording cylinderfuls of water. In such a construction, or in the numerous modifications of it, the pressure is for all practical purposes preserved. There are also positive rotary meters.

It has been commonly suggested that water for domestic purposes should be charged for according to the quantity actually consumed. On the Continent many towns have followed the example set by Berlin, which has gradually given an entire meter-supply; but in Berlin, owing to the flat system, there are on an average seventy occupants per house—i.e. per supply; while in London there are only on an average 7·39 per supply. In Berlin the landlord of the whole house is made liable for the water, there being one meter; thus only a tenth of the meters that would be required for an equivalent London population is needed. Further, the tenants, although they can draw as much water as they please, are very soon checked if they waste it, because the landlord has to pay for the whole, and he at once complains if the tenants' fittings are out of order or the water is otherwise wasted. On the other hand, many persons say that it is of such vital consequence to encourage the poor in habits of cleanliness that it is worth while to pay for water by means of a rate upon the value of the houses, although thereby the well-to-do man living in a fashionable neighbourhood pays a much larger amount per 1000 gallons than does the poor man. But it is no more illogical to charge by a percentage rate on annual value for bringing water to a house than it is to charge in that manner for the use of the sewers taking the water away.

Other plans of charging have been proposed or are in use, such as payment by a rate upon the value of the house plus the employment of a meter, the rate payment on the value covering the supply of a certain number of 1000 of gallons per quarter without further cost to the consumer; but should this number of gallons (which varies according to the annual value) be exceeded, then a 'quantity' charge is made for that which is used in excess. In some cases, where the municipality is the water authority, there is a rate upon the properties using the water plus a general rate upon all properties whether they use the water or not; it being held that warehouses and other properties—even if no water be consumed there—benefit by the water-supply as regards safety from fire. There is another system of water-supply now largely extended in London—viz. that of high-pressure water (at 700 lb. to the square inch) provided for the purposes of hydraulic lifts, and for other motors, in establishments needing for brief periods considerable motive power.

The London water-supply has for some half a century been in the hands of eight companies—the Chelsea, the East London, the Grand Junction, the New River, and the West Middlesex supplying the town north of the river; the Kent, the Lambeth, and the Southwark & Vauxhall supplying the south side. The Chelsea, the Grand Junction, the Lambeth, the Southwark & Vauxhall, and the West Middlesex derive their supply practically entirely from the Thames, although some of them obtain a portion of this supply from wells and springs. The intakes of these companies are, none of them, lower than Hampton. The East London also procures a very small portion of its supply from the Thames at Sunbury, the remainder, and by far the principal part, being derived from the river Lea, or from the chalk wells in the Lea valley. The New River, as originally planned by Sir Hugh Myddelton (the London goldsmith), still brings the waters of the Chadwell, Amwell, and other springs from Hertfordshire to London; but the increased quantity now given by this company is obtained from the river Lea itself, near to the Chadwell spring, and from the chalk wells in the Lea valley. The Kent Company derives its supply entirely from chalk wells.

Sea-water may be rendered drinkable by being filtered through 15 feet of fresh dry sand; but at sea it must be distilled. The distilled water, however, has no air dissolved in it, and is unpalatable; and it has a nauseous odour and taste derived from the decomposition of organic matter in the sea-water. The addition of chemical reagents is objectionable; aeration of a large quantity of water is a slow process, and the air taken up may be of bad quality, as in the hold of a ship. In Dr Normandy's apparatus there is an evaporator in which sea-water is boiled by superheated steam in steam-pipes; the vapour is being cooled down in a condenser. The cooling water in the condenser as it is itself warmed loses its dissolved air; this air is led round and mixed with the steam which is being condensed, and the condensate is fully aerated.

The water-supply of great cities and towns is usually treated of in the articles on those towns (as in those on Bombay, Chicago, Glasgow, Liverpool, Manchester, New York, &c.). See also the articles FILTER, HYGIENE, IRRIGATION, RAINFALL, SEWAGE, SHEFFIELD, TANSA; and for ancient water-tanks, see CEYLON. On water-supply see, for the United Kingdom, works by Hughes (1867; new ed. 1882), Humber (1876), Ansted (1878), De Rance (1882), Silverthorne (1888), Slagg (1888), and others; for the United States, Fanning (1877; new ed. 1882) and Nichols (1883); for Canada, Egypt, India, &c. Jackson (1886; new ed. 1889) and Stone (1889); for London specially, Bolton (1884; new ed. 1888).

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Water-beds, a valuable contrivance for the comfort of the sick, especially for minimising the risk of Bed-sores (q.v.). They are somewhat similar to Air-beds (q.v.), but, while more costly, are more serviceable and durable. The water-bed is laid on an ordinary bedstead, either upon or in place of the mattress, and filled with warm water to the proper degree; it must not be so full that it will not yield readily under the body of the patient. Clothes, pillows, &c. are then laid on it, as on a common bed, and the patient transferred to it.

Water-beetles, beetles which live on or in the water, especially the somewhat similar Amphizoideæ, Haliplidæ, Dytiscidæ, and Gyrinidæ, and also the quite different clavicorn Hydrophilidæ. The Dytiscus, common in stagnant water, is olive-green above, and oval in shape. The respiratory

A, *Dytiscus marginalis*, or Great Water-beetle; B, larva.

organs of the perfect insect are not adapted to obtaining air from the water; the creature must therefore come occasionally for air to the surface of the water, where it lies on its back, the openings of its air-tubes, which are in the last segment of the abdomen, being exposed.

Water-boatman. See BOAT-FLY.

Water Brash. See INDIGESTION.

Water-bug, the popular name of a tribe of insects (Hydrocorisæ) in the order Rhynchota. They live almost entirely in water, and feed upon other aquatic insects. One of their most distinctive characteristics is the shortness of the antennæ which lie concealed in pits near the eyes. As representatives of the tribe may be noted the Water-boatman (Notonecta), whose long hinder legs are thrown out like sculls, and the Water-scorpions (Nepa and Ranatra), with fore-legs adapted for seizing prey, and with a pair of terminal tail-like organs which form an air-tube.

Waterbury, a city of Connecticut, 33 miles by rail SW. of Hartford, on the Naugatuck River. It has a fine central park, with the city hall and St John's Episcopal church (spire 200 feet) opposite, and is a busy manufacturing place. It is most important for its brass wares, but it is its cheap watches that have carried its name round the world. Pop. (1880) 17,806; (1890) 28,646.

Water Caltrop. See TRAPA.

Water Chestnut (*Marron d'Eau*), the name given in France to the edible seeds of the *Trapa natans* (see TRAPA). The name water chestnut is also given to the edible tubers of the *Scirpus tuberosus*, a plant of the natural order Cyperaceæ (q.v., and see BULRUSH), which is cultivated by the Chinese in tanks very abundantly supplied with manure. It is destitute of leaves, except a slender short sheath or two at the base of each culm. It is stoloniferous, and the tubers are produced on the stolons. They are in high estimation among the Chinese, both for food and as a medicine, and are eaten either raw or boiled.

Water-clock. See CLEPSYDRA.

Water-closet. See SEWAGE.

Water-colours are pigments prepared for the use of artists and others by mixing colouring substances in the state of fine powder with a soluble gum such as gum-arabic. These are made up in the form of small cakes, which are rubbed down with water and applied with a brush to paper, ivory, and some other materials. Moist water-colours are made up with honey or glycerine as well as gum, and are prepared so as to be kept in small earthenware pans or metallic tubes. Dry cakes require to be rubbed down with water on a glazed earthenware palette or slab, but moist colours can be mixed with water for use by the friction of a brush, so that the japanned lid of the box which contains them serves for a palette. The latter are accordingly very convenient for sketching from nature. The most important water-colour pigments are noticed under various heads which are given in the article PIGMENTS.

In water-colour painting two methods are employed; by one the artist works in transparent colours, by the other in opaque or body colours. In working by the latter method, which somewhat resembles oil-painting in its nature, Chinese white (see WHITE PIGMENTS) is mixed with light colours to give them body. Not only is there much artistic work done solely in transparent colours, but it is almost always these that are used for tinting mechanical drawings, maps, and the like. Some artists freely combine transparent, semi-transparent, and opaque colours. The quick drying of the water-colour pigments is favourable to rapid execution; and greater clearness is attained than is practicable in oils. In water-colour painting the texture of the paper employed is often of importance. Water-colour drawings are of course more easily injured by damp than oil-paintings.

WATER-COLOUR PAINTING, the most delicate of the graphic arts, is in an especial sense an English art. It was in England first that it attained to the dignity of a recognised artistic pursuit, and came to be—what it now is—admittedly the rival of oil-painting in brilliancy and power. It has had a large share in the modern prosperity of the fine arts, and of late has been practised by eminent artists in various countries, as France, Germany, and Austria.

In the illumination of missals water-colours were used mixed with the body white; and the same is true of the miniature-painting of the 18th century. Frescoes and painting in tempera were also in a sense works in water-colour. But the art of water-colour, as we now understand the term, had its origin in quite a different way. Dürer and certain of the German, Flemish, and Dutch artists were accustomed to outline drawings with a reed pen, and fill in those outlines with an auxiliary flat wash. Gradually the hard lines were replaced by touches with the brush, and the result was a monochrome in browns and grays, bistre or Indian ink. These again came to be tinted, and so suggested the full use of colours. Rembrandt often drew in brown, and added dashes of strong colour; and Rubens produced something very like modern water-colour drawings.

The modern art became emancipated from the old traditions by 'gradual disuse of the general shadow tint, and imitation of the local colour, not alone of the objects themselves, but of every modification resulting from light, dark, half-tint, or distance, a method which at once led to far greater

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truth and richness than could ever have been attained by merely passing colour over the universal shadow tint.' The stained drawing gradually gave way to the more perfect tinted drawing. But the tinted style predominated till 1790; and it may be said that the water-colours of the 18th century were tinted monochromes. It was in the 19th century that Girtin and Turner showed what scope and power there were in the art.

Artists who used the stained and tinted manner were Malton (1726–1801), Paul Sandby, R.A. (1725–1809), often called, though without justification, 'the father of water-colour art;' also, all in the last half of the 18th century, Grimm, Webber, Clevely, Pars, and Rooker. Wheatley, Westall, and Gilpin used water-colour as well as oil. Rowlandson, Cristall, Hills, Wright, Mortimer, Gresse, Hearne, J. R. Cozens, and Dayes greatly promoted the growing art. Nicholas Pocock (1749–1831) displayed a new richness and force. John Smith (Warwick Smith) first got beyond the weakness of mere tinting. Thomas Girtin (1773–1802) attained great richness of tone and breadth; his compositions were grand but simple; he massed light and shade in broad and sometimes abrupt forms. J. M. W. Turner (q.v.; 1775–1851) soon distanced all his predecessors and contemporaries, and in his hands water-colour painting became a new art. He wholly abandoned preliminary tinting; minute details are imitated in local colour; his work is marked by breadth, fullness, warmth as well as grace. Other more or less important names are those of Delamotte, Varley, J. J. Chalon, A. E. Chalon, Samuel Prout, Peter de Wint, Liverseege, Cotman, David Cox, Essex, Richardson, Newton, Bonington, Copley Fielding, Robson, W. Hunt, Ross, Harding, Cattermole, Holland, Penley, Lewis, Houghton, and Pinwell; more recent are Birket Foster, Sir John Gilbert, &c.

The Society of Painters in Water-colours was instituted in 1804; it held its first exhibition in 1805; and its annual exhibitions are now as crowded as those of the Royal Academy. Formal recognition of its dignity was accorded in 1882, when the society obtained a charter, and became the Royal Society of Painters in Water-colours. There are other similar associations, as the Institute of Painters in Water-colours. An admirable collection illustrative of the history of the art may be studied in the South Kensington Museum.

For the history of water-colour painting, see the article PAINTING (p. 698); Redgrave's Introduction to the Catalogue of Water-colours at South Kensington (1877), and his son's *Water-colour Painting in England* (1892); Hamerton's *Graphic Arts* (1882); Cosmo Monkhouse, *The Early English Water-colour Painters* (1889); and J. L. Roget, *History of the 'Old Water-colour' Society* (2 vols. 1891).

Water-cress. See CRESS.

Water-cure. See HYDROPATHY, BATH.

Water-deer, a name given to a small Chinese Musk-deer (q.v.) of aquatic habits; also in Africa to one of the Chevrotains (q.v.). The water-buck, formerly common in South Africa, was an antelope (*Kobus ellipsiprymnus*) much given to being about the edge of lakes and rivers, and with exceptional powers of swimming.

Water-dropwort (*Œnanthe*), a genus of plants of the natural order Umbelliferæ; having ovato-cylindrical fruit, not prickly nor beaked, each carpel with five blunt convex ribs, and single vittæ in the interstices; the calyx teeth lanceolate; the petals obcordate and radiant, with an inflected point; the partial involucre of many rays; the flowers of the circumference on long stalks and sterile, those of the centre subsessile and fertile. A number of species are natives of Britain, large perennial plants, with a strong and generally disagreeable aromatic smell, and compound or decompound leaves. The Common Water-dropwort (*Œ. fistulosa*) and the Hemlock Water-dropwort, or Water Hemlock (*Œ. crocata*), are both common in wet places in Britain and throughout Europe, and both are narcotic acrid poisons. The roots of the latter have some resemblance to small parsnips, and hence fatal accidents have frequently occurred. The Fine-leaved Water-dropwort, called Water Fennel by the Germans (*Œ. phellandrium*, formerly known as *Phellandrium aquaticum*), is also common in ditches and ponds both in Britain and on the Continent. It has a jointed root-stock (*rhizome*), with tufted whorled fibres, and a strong zigzag stem dilated at the base. It is not so poisonous as the other species just named. It was at one time erroneously regarded as a specific against pulmonary consumption; but it has been advantageously employed in pulmonary complaints.

Hemlock Water-dropwort (*Œnanthe crocata*).

Water-engine. See WATER-POWER.

Waterfalls occur most frequently in mountainous countries, where the streams from the mountain sides enter the valleys. It is only when the side of the valley is composed of hard rock that there can be a waterfall; in friable strata the stream wears out a ravine or side-valley. These mountain waterfalls, however, are generally rather curious and picturesque than grand, the volume of water being in most cases comparatively insignificant, though the height of fall is occasionally very great. All mountain waterfalls necessarily change their aspect from season to season—in winter a roaring torrent plunging headlong into the abyss, in summer often a mere film of water trickling down the face of the precipice. Waterfalls in comparatively level districts are not nearly so common, and their height of fall is insignificant compared with that of mountain cataracts; but the much greater volume of water, and its steady and even flow to the head of the precipice over which, in solid column, it descends with a thundering plunge place such waterfalls among the grandest of nature's phenomena. It is where the course of a large river passes from a higher to a lower plateau, and where the upper plateau is edged with rock, that the grander cataracts are formed. If the rocks are of the same hardness from top to bottom, the edge of the escarpment, supposing it to be perpendicular at first, becomes worn off, and a slope or *rapid* is formed. But when the upper edge is hard and the under strata soft and friable, the reverberation of the spray wears away the softer parts below, leaving a projecting ledge at the top, which breaks off, piece by piece, as it becomes too much undermined, so that the fall is constantly receding. For the utilisation of waterfalls to generate electrical energy, see TRANSMISSION OF POWER. The cataracts of the Velino and Anio, in Italy, are

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beautiful artificial imitations. The most important waterfalls are discussed under their own names, the river on whose course they occur, or the districts to which they belong. Among them are :

Yosemite (3 plunges)	2660 feet.
Roraima Fall, Guiana (2 plunges)	2000 "
Grand Falls, Labrador	2000 "
Sutherland Falls, New Zealand (3 plunges)	1904 "
Kukenam Fall, Guiana (sheer plunge)	1500 "
Gavarnie Fall, Pyrenees	1380 "
Staubbach	866 "
Kaieteur Falls, Guiana	740 "
Tequendama Falls, near Bogotá	625 "
Victoria Falls, Zambesi	400 "
Rio Iguassú, southern Brazil	215 "
Shoshone	210 "
Foyers, highest in Britain (2 plunges)	205 "
Hay River, Alaska	200 "
Niagara	169 "

Water-flea, a popular name for minute aquatic Crustaceans such as Daphnia among Cladocera, Cypris among Ostracoda, and Cyclops among Copepoda. The common *Daphnia pulex*, abundant in fresh water, is a good representative. The body is enclosed in a bivalve shell; there is a large single eye; a pair of large antennæ are used as swimming organs. The Daphnids are marvellously prolific, and for prolonged periods parthenogenetic. There is an interesting difference between the winter eggs which require fertilisation and the summer eggs

Water-flea (*Daphnia similis*).

which do not. The females have a dorsal brood-chamber between the shell and the back. Of related genera Sida, Moina, Lynceus, Polyphemus, and Leptodora may be noted. In Cypris also the shell is bivalve; there are five pairs of appendages on the head and two on the body; most of these are used in swimming or creeping. Related to Cypris but living in the sea are Cythere, Halocypris, Cypridina, &c. Among Cyprids parthenogenesis again occurs, and in some species males have never been observed, while parthenogenetic development has been traced for as many as forty successive generations. The females bear large egg-sacs. In Cyclops the body is more distinctly segmented and the shell is not bivalve; the head bears antennæ, mandibles, and maxillæ, and the first five segments of the thorax bear swimming appendages. Resembling Cyclops and also a fresh-water form is Canthocamptus, while Cetochilus and Clausocalanus represent numerous marine Copepods. Water-fleas feed on microscopic plants and animals and on organic debris, while they themselves —often occurring in countless swarms—form an important part of the food-supply of certain fishes.

Waterford, an Irish county in the province of Munster, to the east of Cork. Its greatest length from east to west is 52 miles, and its breadth north to south 28; the total area being 721 sq. m., or 461,552 acres. The surface is in general mountainous, the principal ranges being Knockmeledown (2609 feet) and Cummeragh (2478). The Suir (q.v.) and the Blackwater (q.v.) are the chief rivers. The climate is moist, and the soil over a considerable part of the county is marshy; but the upland districts are well suited for tillage, and the lower pasture-lands produce excellent butter. In geological structure the mountains present the old and new slate, separated by red and gray quartz rock and quartzose slate. The valleys belong to the limestone series. Lead, iron, and copper are found, the latter having been worked at Knockmahon for many years. Marble of several colours is quarried near Cappoquin and Whitechurch, and potter's clay of good quality is found at Kildrum near Dungarvan. There are some cotton manufactures, and the fisheries are of some importance. The chief towns are Waterford, Dungarvan, Tramore, Portlaw, and Lismore. Before 1885 the county and the boroughs sent five members to parliament; now the county sends two and Waterford city one. Pop. (1841) 196,187; (1861) 134,252; (1881) 112,768; (1891) 98,130. This district, in common with the adjoining county of Wexford, is believed to have been anciently peopled by a Belgic colony. The Danes also formed a settlement at the mouth of the Suir. From the date of the invasion Waterford became a stronghold of the English, large grants having been made by Henry II. to the De la Poers; and in all the alternations of the subsequent struggle with the Irish population it continued for the most part a firm centre of English influence. The county abounds with ecclesiastical and military antiquities of the Celtic and Danish as well as the Anglo-Norman period.

WATERFORD, the county town, but itself a county of a city and a municipal and parliamentary borough, is on the river Suir, at the head of the tidal estuary, Waterford Harbour, 97 miles SSW. of Dublin by rail. The city, with the exception of its suburb of Ferrybank, with which it is connected by a wooden bridge of thirty-nine arches, lies on the right bank of the Suir, along which a handsome and spacious quay extends for a distance of nearly a mile, and from which the city ascends gradually in well-built streets. Vessels of 2000 tons can now discharge their cargoes at the quay; but the place has not a thriving look. The chief public buildings are the Protestant and Roman Catholic cathedrals, the Protestant episcopal palace, the (Catholic) college of St John, the city and county court-houses, besides hospitals, &c. The chief trade is with England in the export of butter, pork, bacon, corn, flour, eggs, and live-stock. There is a shipbuilding-yard, with patent slip, graving-bank, and dock on the Kilkenny bank of the river. Waterford is originally of Danish foundation, but in 1171 the city was taken by assault by Strongbow, by whom it was enlarged and made a place of strength. It received a charter from John, which was forfeited under James I., but restored by Charles I. in 1626. But few remains of its ancient buildings are now to be seen. Pop. (1881) 22,457; (1891) 21,693; and of parliamentary borough, 27,623 (of whom 25,418 were Catholics). See Ryland's *History of the County and City of Waterford* (1824).

Waterford, LOUISA, MARCHIONESS OF (1818–91), was ranked by G. F. Watts as one of the greatest real artists of our time in virtue of her pictures ('Spring,' 'Christmas,' 'The Miracle of Healing the Two Blind Men') at Ford Castle, Northumberland, and her book-illustrations. She was the daughter of Lord Stuart de Rothesay, and widow of the third Marquis of Waterford. Nearly 350 of her drawings were exhibited in London in 1892.

Water-gas. See GAS-LIGHTING, p. 104.

Water-glass, or SOLUBLE GLASS. See GLASS, Vol. V. p. 245.

Water-hemlock. See HEMLOCK.

Water-hen, or MOOR-HEN (*Gallinula chloropus*), one of the rails (Rallidæ), resident and widely distributed in Britain. It occurs throughout Europe, except in northern parts, and from North Africa to Cape Colony, from Ceylon and the

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Philippines to Japan and Lake Baikal in Siberia. It is represented by closely allied forms—*G. galatea* and *G. tenebrosa*—in America and Australia respectively. It lives by ponds and streams, makes its nest of matted reeds and sedges generally among the thick vegetation near the water's edge, begins to breed before the winter is well over, and produces two or even three broods in the season. The (seven to nine) eggs are buffish-white speckled with reddish-brown; 'the young from the first nest assist their parents in building another, and even in taking care of the second brood.' The food generally consists of slugs, worms, grass, grain, and insects, but the bird will also devour the young of other water-fowl. 'The call-note is a loud *crek-rek-rek*, several times repeated, especially towards evening.' In length the bird measures about a foot; the predominant colours are dark

Water-hen (*Gallinula chloropus*).

olive-brown and dark slate-gray, but there are white streaks on the flanks, and the under tail-coverts are white. See Howard Saunders, *Manual of British Birds*.

Water-hog. See WART-HOG.

Water-horehound. See GYPSY-WORT.

Waterhouse, ALFRED, architect, was born at Liverpool, 19th July 1830, studied at Manchester, and became A.R.A. in 1878, R.A. in 1885, and a member of the Berlin Academy of Arts in 1890. Among his works are the Manchester town-hall and assize courts, Owens College, Girton College, the new Natural History Museum at South Kensington, several London clubs, the new St Paul's Schools, besides mansions throughout the country, and alterations on some of the Oxford colleges.

Waterland, DANIEL, divine, was born at Waseley rectory in Lincolnshire, February 14, 1683. He studied at Magdalen College, Cambridge, became fellow in 1704, and by 1727 canon of Windsor, in 1730 archdeacon of Middlesex and vicar of Twickenham. Waterland was a stout controversialist, and defended the faith that was in him with great vigour against Samuel Clarke, Daniel Whitby, and many more. Indeed he was thought in his day to have proved the fact of Christ's divinity. He died 23d December 1740.

His best books are the two *Vindications* of Christ's divinity (1719–23), and the *Further Defence* (1725), *A Critical History of the Athanasian Creed* (1724), *A Review of the Doctrine of the Eucharist* (1737), and *Scripture Vindicated* (1734), in answer to Tindal. There is a complete edition of his works, with Memoir, by Bishop Van Mildert (Oxford, 11 vols. 1823–28).

Water-lily, a name commonly given to the different species of Nymphæa and Nuphar, and also of Nelumbium, all genera of the natural order Nymphæaceæ (q.v.), and indeed often extended to all the plants of that order. Britain produces three species—*Nymphæa alba*, the White Water-lily, and *Nuphar luteum* and *Nuphar pumilum*, called Yellow Water-lilies. The two former are frequent in still waters in most parts of

White Water-lily (*Nymphæa alba*).

the island; *Nuphar pumilum* is more rare, and chiefly found in Scotland. All have heart-shaped leaves, floating on the water. The beautiful and fragrant white flowers of *Nymphæa alba* float upon the water during the day, but collapse and droop upon or sink below its surface during the night, rising and expanding again in the morning. The flowers of the yellow water-lily, which are of comparatively little beauty, are raised by their stalks a little above it. The seeds of these, as well as of the Water-lily of the Nile (*Nymphæa lotus*; see LOTUS), are farinaceous, and are sometimes used for food. The root-stocks of *Nymphæa alba* contain a large amount of gallic acid, and have been used in dyeing. Numerous species of tropical and subtropical Nymphæa are cultivated in British aquaria for their beautiful and fragrant flowers. The Sweet-scented Water-lily of North America (*Nymphæa odorata*) has a large white flower of great beauty, and of very sweet smell. Not only *N. lotus*, but also *N. rubra* and *N. pubescens*, are sacred plants to the Hindus. *N. cærulea* was held sacred by the ancient Egyptians.

Waterloo, a village or small town (pop. 3600), 11 miles S. of Brussels, which has given its name to the decisive battle fought near it on the 18th June 1815. On that day Wellington had collected 50,000 infantry, 12,400 cavalry, and 156 guns on the low ridge, some 3 miles long, which bestrides the Charleroi road near Mont St Jean. Of these troops only one-third were British, and many raw recruits; of the others a large proportion being Dutch-Belgians were disaffected and sympathised with the French. Along the main ridge, which was not entrenched, twenty battalions, some 15,000 men, were deployed in front line, and twenty battalions stood in second line under cover of its reverse slope. Some 14,000 men were in reserve in two groups, and 6000 in advance occupying the important posts of Hougomont (1200), La Haye Sainte, Papelotte, La Haye, and Smohain. The cavalry brigades were posted on the left flank and behind the centre and right, two at each place; 4000 horsemen being held in reserve. One-third of the guns were in action in front of the deployed line, one-third in support behind the right and centre, and the remainder in reserve. The right was strong so long as Hougomont held out; the left was weak in comparison, but the Prussians were approaching that flank from Wavre. On the right of the ridge was a steep ravine, whilst its left merged into a plateau. The front slope was gentle, continuous, and unobstructed, except by the farm enclosures, rising to

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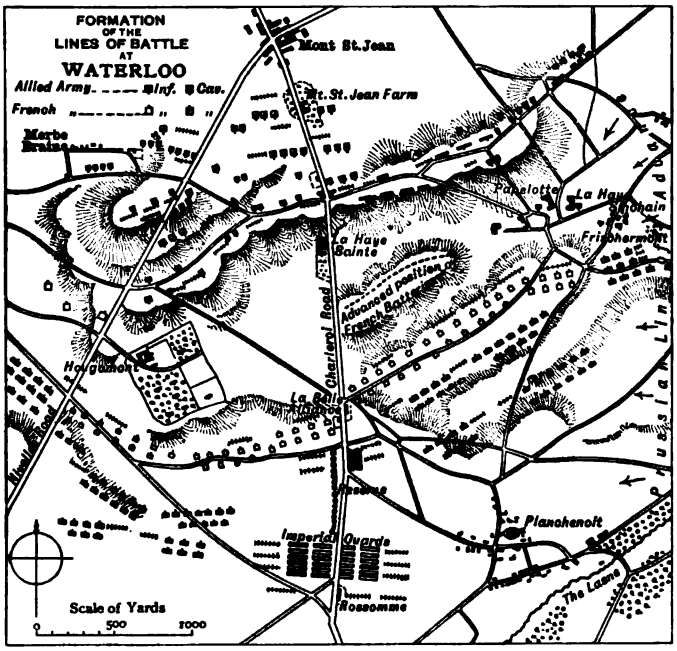
an opposite ridge of the same character on which was deployed the French army, some 61,000 of all arms, under Napoleon. Its disposition was as follows: in front were 31,000 infantry, in two lines of battalion columns at deploying intervals. On each flank was a brigade of cavalry (1700 sabres); close in rear of the centre a reserve of the three arms, 10,000 strong; and behind it the main reserve, 11,000 strong, composed of the Imperial Guard. Two large bodies of cavalry, each about 2600 sabres, were also posted behind the main infantry line. Of the 246 guns 84 were pushed down the slope in front of the infantry, 96 were held in reserve, and the remainder formed local reserves with the cavalry behind the right and left centre.

The quality of the French troops was excellent; there were none that had not already made one or more campaigns, they were all of the same nation,



Note.—The Village of Waterloo is about a mile north of Mont St Jean.

and commanded by one in whose genius they had unbounded confidence. The opening of the campaign, too, seemed to justify their confidence. Two days before, under his command, they had defeated the Prussians at Ligny, and seen Wellington retire from Quatre Bras. Now 33,000 men and 96 guns, under Grouchy, were pressing the former, who, having no magazines west of Namur, might be expected to retire eastward on that place; while the latter, fearful for his communications westward, through Ghent to Ostend, offered battle with troops about equal in numbers but infinitely inferior to those of France.

The heavy rain that had been falling for many hours ceased at 4 A.M. on the 18th, but Napoleon did not attack until 11.30, owing, as he asserts, to the statement of his artillery officers that guns could not move until the ground had dried a little—a very inadequate reason for such a fatal loss of time. He occupied the interval with an ostentatious review of his army. The battle commenced with a violent cannonade all along the line. Then three divisions of Reille's infantry, on the west of the Charleroi road, preceded by clouds of skirmishers, attacked the homestead of Hougomont, and after a severe struggle gained the road south of the château, but were brought to a standstill by the loopholed garden-wall. The orchard east of the garden was temporarily occupied, but attempts to get into the farm-buildings failed, and reinforcements from the British right then drove them beyond the southern garden-wall with heavy loss. The struggle was constantly renewed throughout the day, but the defenders held the farm and out-buildings to the last.

Meanwhile the guns on both sides kept up a continuous fire, and to prepare for an attack against the British centre Napoleon advanced seventy-four to a lower ridge only some 600 yards from it. The movement was delayed owing to the presence of troops to the eastward being signalled, and cavalry were sent to ascertain who they were. But at 1.30 the French infantry on the east of the Charleroi road advanced in dense columns flanked by cavalry—in all about 25,000 men, chiefly from D'Erlon's corps. The flank brigades first came into contact, and at 2 o'clock the British were expelled from the orchard of La Haye Sainte, but not from the buildings, while an indecisive action raged at Papelotte and Smohain. Simultaneously a charge of French cuirassiers swept down parallel to and west of the Charleroi road, scattered some Hanoverian troops, and passed between the hastily formed British squares, within which the gunners of the advanced batteries took refuge. A Belgian brigade taking to flight left Picton's weak division to withstand, unsupported, the attack of the heavy French columns. The moment was critical, as no infantry reserves were at hand, and the two brigades of heavy cavalry were therefore ordered to charge. One, the Household brigade, overthrew the French cuirassiers, cleared the space in rear of La Haye, and pursued to the west of the Charleroi road for some distance; the other, Ponsonby's, attacked the French infantry columns, and drove them back in disorder. Sweeping onwards, these three regiments reached the advanced French batteries, but were then taken in flank by French cavalry, and retreated with great loss under cover of the charge of their own light cavalry from the left wing. It was now nearly 4 o'clock, and determined but unsuccessful efforts had been unceasingly made by the French to gain possession of Hougomont and La Haye. Between that hour and 6 P.M. four great cavalry attacks were then delivered against the British right centre. Some 4400 horsemen rode in the first, and nearly twice that number in the third. The British squares stood firm against these attacks, but suffered great loss from the enemy's artillery and skirmishers whilst in this dense formation.

These impetuous onslaughts were, however, the desperate efforts of a commander who felt that he must sweep away the enemy in his front or perish, for at 4.30 part of Bülow's corps of Blücher's army appeared upon the field, and by six o'clock 29,000 men and 64 guns were pushing forward against the French right and rear. Blücher, with a loyal disregard to the possible disaster that might result to himself from such a course, had readily agreed to support Wellington with his whole army instead of

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retiring towards his base. His leading troops were indeed within 8 miles of Wellington's left at the time when Napoleon assumed them to be retiring before Grouchy towards Namur. The country separating the allies was little suited to the rapid march of large bodies of men. The deep and miry cross-roads had become almost impassable owing to the heavy rain. The men had been drenched and tired out on the 17th. A fire in Wavre hindered their passage through that town, and defective arrangements, causing two columns to cross on their march, still further delayed the general advance. A start could not be made until 7 A.M., and the rate of marching did not exceed 1 mile an hour. Grouchy, too, having ascertained the true direction of their march, was now pressing on their rear, and had to be held back. The rain, which Napoleon says prevented him attacking in the early morning, was therefore also responsible for many of the long hours during which Wellington had to bear unaided the full brunt of his attacks, and, but for Blücher's dogged resolution and his influence upon his men, might have prevented altogether that junction of the allies which they had designed on the night of the 17th, and to achieve which Wellington stood fast at Mont St Jean.

The Prussian corps advanced on a wide front, their left being directed on Planchenoit. To oppose them Napoleon (when assured of their approach by the capture of an orderly carrying despatches from Bülow at 1 P.M.) had detached 10,000 of the Young Guard under Lobau, as well as the cavalry (2400 sabres) already reconnoitring in that direction. He also wrote to Grouchy hoping that he was near enough to take Bülow in flank, but that officer was thoroughly committed to a severe action at Wavre, where Napoleon's letter reached him at 6 or 7 P.M.

Trusting that he could thus hold Bülow in check, Napoleon then continued his efforts against the British, whose front line had been somewhat altered by bringing forward two batteries and two brigades from the reserve. The latter deployed in a four-deep line extending from the north-east corner of the Hougomont enclosure to the main ridge. Soon after 6 P.M. Ney was entrusted with a fourth attack upon La Haye Sainte, and succeeded in gaining possession of the farm-buildings. At the same time and up to 7.30 the attack was pressed near the Charleroi road. Clouds of skirmishers and artillery fire repeatedly caused the allied battalions to deploy and advance down the ridge, when masses of French cavalry suddenly attacked and obliged them to form squares and so present vulnerable targets to the guns and sharpshooters.

But severe fighting was now going on for the possession of Planchenoit, and over 50,000 Prussians were engaged. At 7.30 Napoleon determined on one more attempt to crush the adversary in his front. The Imperial Guard advanced in two columns between Hougomont and La Haye Sainte. That on the right, consisting of four battalions, moved first, and, unchecked by artillery fire, gained the summit of the ridge. The British Guards, who were there lying down in a line four-deep, sprang to their feet at Wellington's command, fired a volley and charged. Shattered by this enveloping fire, the heavy French column fell back in confusion. Ten minutes later the left column, six battalions, followed from the south-east corner of Hougomont against the same part of the British line. Adam's light brigade, on the right of the Guards, thereupon wheeled forward its right one-eighth of a circle, fired into their flanks and then charged. The Guards crushed with their fire the head of the column, and its rout was complete. A general advance of the whole British line then took place, and the battle was won.

In the meantime the Prussians drove the French in confusion from Papelotte, which they had won, on La Belle Alliance, thus exposing Lobau's left. His troops, assailed at the same time in front, then gave way, and after an obstinate resistance Planchenoit was wrested from them. This success laid open the main line of retreat to the fire of the Prussian guns, which now almost crossed the British front and turned the defeat into the most disastrous rout of a great army which history records. The allied cavalry pressed on in their eagerness so hastily as to exchange sabre cuts in the coming darkness. The losses were great in proportion to the numbers engaged: allies, 22,500, of whom 7000 were Prussians; and French (including prisoners), 32,000. The result was the deposition of Napoleon and his exile to St Helena.

Though very many books had been written on the subject, a complete and thoroughly reliable account of the great campaign of 1815 had not yet appeared in 1892, when it was expected that the forthcoming work of the American author, Mr Ropes, would soon supply this want. But before entering upon a study of the campaign the *Waterloo Lectures*, by Lieutenant-colonel C. C. Chesney, R.E., should certainly be read, referring as they do to all the best sources of information, such as the works of Charras, Thiers, Brialmont, Siborne, Shaw-Kennedy, Gurwood, Dorsey Gardner, Hooper, &c., and critically examining the many discrepancies which they present. See also the article NAPOLEON. It should be added that the French named the battle from Mont St Jean, and the Prussians from Belle Alliance; but the name Waterloo is now commonly used in France and Germany as well as in Britain. The mound surmounted by the Belgian lion is conspicuous on the field.

Waterloo, capital of Black Hawk county, Iowa, on both sides of the Cedar River, 93 miles by rail W. of Dubuque, with mills, foundries, and furniture and other factories. Pop. 6674.

Water-marks. See PAPER, p. 741; and BANK-NOTES.

Water Ousel. See DIPPER.

Water-power. See WATER.

Waterproof. See INDIA-RUBBER.

Water-rail. See RAIL.

Water-rat. See VOLE, MUSK-RAT.

Water-soldier (*Stratiotes aloides*), a plant belonging to a genus of the natural order Hydrocharideæ, is common in lakes and ditches in the east of England. It is a singular plant with numerous leaves, which are strap-shaped and spring from the root, from which also springs the two-edged flower-stem, bearing the spathe with beautiful and delicate white flowers. In autumn the whole plant disappears, the root alone remaining at the bottom of the water, from which a number of young plants arise in spring, filling up ditches, so that nothing else can grow in them. The water-soldier is a very ornamental aquatic plant.

Water-soldier (*Stratiotes aloides*).

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Water-spaniel. See SPANIEL.

Waterspout. See WHIRLWIND.

Water-supply. See WATER.

Water-tight Compartments. See SHIPBUILDING, Vol. IX. p. 406.

Waterton, CHARLES, naturalist, born at Walton Hall near Wakefield, 12th June 1782. Of Catholic parentage, he was educated at Stonyhurst, and, devoting himself to researches in natural history, spent the years 1812–23 in America, publishing on his return his most interesting and successful *Wanderings in South America* (1825; 6th ed. 1866; and often since re-edited by J. G. Wood and others). His *Natural History Essays* appeared in three series, 1838–57; and a new ed., with Life of the author by Moore, was issued in 1879. Waterton, who was rather a keen observer and racy writer than a scientist of the new school, died 27th May 1865.

Watertown, (1) a town of Massachusetts, on the Charles River, 8 miles W. of Boston, with a national arsenal and manufactories of stoves, woollens, paper, stockings, and cardigan jackets. Pop. 7058.—(2) Capital of Jefferson county, New York, on Black River, 12 miles by rail E. of Sackett's Harbour on Lake Ontario. The rapids supply power for numerous factories turning out spring-wagons, sewing-machines, farming implements, flour, paper, woollens, &c. Pop. 14,725.—(3) A city of Wisconsin, on both sides of Rock River, 44 miles by rail W. by N. of Milwaukee, with manufactories of flour, beer, chairs, blinds, &c. Here is the North-western University (Lutheran; 1864). Pop. 8755.

Waterville, a village of Maine, on the Kennebec (navigable to this point by a dam and locks at Augusta), at Ticonic Falls (18 feet), 19 miles by rail N. by E. of Augusta. It contains several mills and factories, and is the seat of Colby University (Baptist; 1820). Pop. 7107.

Water-violet, a plant of the genus Hottonia, so called from the likeness of its flower to the stock-gillyflower, once known as violet.

Watervliet. See SHAKERS.

Watford, a market-town of Hertfordshire, on the Colne, 15 miles (by rail 18) NW. of London. The Perpendicular church, restored in 1871, contains some interesting monuments of the Morrisons and Cassells, Earls of Essex, whose seat, Cassiobury, is close to the town; and there are also the London Orphan Asylum (inst. 1813; transferred hither, 1871), the Salters' Company's almshouses (1873), the endowed schools (1874), the public library and school of art (1874), &c., besides manufactures of silk and paper. Pop. (1851) 6546; (1881) 12,162; (1891) 16,819.

Watkin, SIR EDWARD WILLIAM, was born at Salford in 1819, and was employed in his father's counting-house till 1845, when he became secretary to the Trent Valley Railway; and from that time onward he has been known as director or manager of several of the most important railways, especially of the South-Eastern. In 1861 he undertook a mission to Canada in connection with the union of the Canadian colonies, and was returned to parliament in 1864, his long parliamentary career being most closely associated with Hythe. He has done much to help in securing parks for the people, especially in Manchester, and was made a baronet in 1880. A strenuous promoter of the Channel Tunnel, he contributed the article on that head to this work. Another undertaking of his is a great tower on the Wembly Park estate, between Willesden and Harrow, to stand on an eminence 174 feet above sea-level, and to exceed the Eiffel Tower (q.v.) by 16 feet—its height being 1000 feet. In 1889 he acquired by purchase part of Snowdon.

Watling's Island, one of the Bahamas (q.v.), the probable landfall of Columbus.

Watling Street, one of the great Roman highways of Britain, commencing at Dover, passing through Canterbury and Rochester to London, and thence to Chester and York, and northwards in two branches to Carlisle and the Wall in the neighbourhood of Newcastle. Traces of the ancient road are still to be found in many parts of its course, and in some it is still an important highway; a street in London retains its name. It was the line of division in the treaty between Alfred and Guthrum the Dane, and it is still the boundary between Warwickshire and Leicestershire. Of the 'Waetlings' nothing is now remembered. Perhaps a trace also survives in the name Wattlesborough, a place on Watling Street near Wroxeter (*Uriconium*).

Watson, RICHARD, divine, was born at Heversham in Westmorland in August 1737. He was educated at Trinity College, Cambridge, and was elected fellow (1760), professor of Chemistry (1764), and regius professor of Divinity (1771)—of both which subjects he knew but little up till that time. He became prebendary, next archdeacon, of Ely, rector of Northwold in Norfolk, soon after of Knaptoft in Leicestershire, and in 1782 bishop of Llandaff, retaining his other preferments on account of the poverty of the see. He was grievously disappointed at being passed over for promotion to the see of St Asaph in 1806. During an episcopate of thirty-four years he visited his diocese but rarely, giving his mind rather to farming and planting in Westmorland. His house was Calgarth Park on Windermere, and here he introduced the larch to that district, for which Wordsworth did not thank him. A Liberal in politics and theology, he advocated equalisation of the bishoprics, and maintained the right of the Prince of Wales to the regency in 1788. He died July 2, 1816. Besides innumerable sermons, addresses, essays, and charges, he published a famous *Apology for Christianity*, an attempt to answer Gibbon (1776), and *An Apology for the Bible* (1796), in reply to T. Paine. His egotistic autobiography, *Anecdotes of the Life of Richard Watson*, was published by his son in 1817.

Watt, the name of the electrical unit of activity or rate of doing work. It is measured by the product of the voltage or electromotive force of the source into the current supplied. Thus a dynamo which is yielding 30 amperes at a voltage of 100 is working with an activity of 3000 watts. The watt is equal to 0·735 foot-pound per second; so that one horse-power per second is equal to 746 watts. It is customary to use the kilowatt as the practical unit. It is equal to a thousand watts or 1·2 horse-power per second. See ELECTRICITY, OHM, VOLT.

Watt, JAMES, improver, and almost inventor, of the modern steam-engine, was born at Greenock in Scotland on the 19th of January 1736. His father, a general merchant at Greenock, was long a member of the council of that burgh, and for a time a magistrate. His mother, Agnes Muirhead, was a woman of superior endowments. Two members of James Watt's family—his grandfather and an uncle—possessed some local reputation for scientific or engineering ability. The former was a teacher of mathematics, surveying, and navigation at Crawfordsdyke near Greenock; the latter was a land-surveyor and engineer. James Watt was very weakly as a child, and, being unable to go to school with regularity, he became to a great extent his own instructor. His mother taught him reading, and his father writing and arithmetic. He early

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manifested a turn for mathematics and calculations, and a great interest in machines, and accordingly —his father's business, for which he had been destined, having greatly declined—he came to Glasgow in June 1754 to learn the trade of a mathematical instrument maker. After a year in Glasgow he went to London, but ill-health compelled him to return home about a year after; he had however made good use of his opportunities, and after his return he set up as a mathematical instrument maker in Glasgow. The incorporation of hammermen of that city put difficulties in his way; but the authorities of the university took him by the hand, appointed him mathematical instrument maker to the university, and gave him the use of premises within their precincts. He occupied these premises from 1757 to 1763, when he set up a place of business in the town. In 1767 he was employed to make the surveys and prepare the estimates for a canal projected to unite the Forth and the Clyde. He made surveys for various canals, for the improvement of the harbours of Ayr, Port-Glasgow, and Greenock, and for the deepening of the Forth, the Clyde, and other rivers. He was also employed on a survey for the Caledonian Canal (q.v.). In this and in other surveys, the accuracy of which was borne witness to by Telford, he made use of a new micrometer, and a machine, also of his own invention, for drawing in perspective.

As early as 1759 Watt's attention had been directed to the capabilities of steam as a motive-force by Mr Robison (q.v.), afterwards professor of Natural Philosophy in the university of Edinburgh, who was then a student in Glasgow. In 1761–62 Watt made a series of experiments on the force of steam, using a Papin's Digester (q.v.); but it was not till the winter of 1763–64 that he began the investigations which ended in his improvement of the steam-engine. A working model of the Newcomen engine, kept for the use of the natural philosophy class in the college, was sent to him to be put in repair. He quickly found out what was wrong with the model, and easily put it into order; but in doing this he became greatly impressed with the defects of the machine, and with the importance of getting rid of them. The result was that he hit upon the expedient of the separate condenser, which prevented the loss of steam in the cylinder. See STEAM-ENGINE, where his other important inventions, the use of the 'air-pump,' steam-jacket for cylinder, double-acting engine, &c., are described.

Watt, soon after perfecting his model, formed a partnership with Dr Roebuck, then of the Carron Ironworks, for the construction of engines on a scale adapted to practical uses; and an engine was erected at Kinneil, near Borrowstounness. But Roebuck got into difficulties; and nothing further was done until, in 1774, Watt entered into a partnership with Matthew Boulton (q.v.) of Soho near Birmingham, when, Roebuck's interest having been repurchased, the manufacture of the new engine was commenced at the Soho Ironworks. A patent for his invention had been taken by Watt in 1769, and a prolongation of his patent for twenty-five years was secured in 1775. This partnership was a fortunate one for Watt—Boulton was bold and enterprising; Watt was timid and shrank from the commercial side of affairs. The advantages of the new engine were in no long time found out by the proprietors of mines; and it soon superseded Newcomen's machine as a pumping-engine. Watt afterwards made numerous improvements in its construction, and in conjunction with his partner Boulton he immensely improved the quality of the workmanship employed in building engines and other machines. Between 1781 and 1785 he obtained patents for a series of inventions—among them the sun and planet motion, the expansion principle, the double engine, the parallel motion, and a smokeless furnace. The application to the steam-engine of the governor was Watt's crowning improvement. He described a steam-locomotive in one of his patents (1784), but did not prosecute it further, neither did he encourage his chief assistant Murdock (q.v.) in his experiments. He also invented a letter-copying press, machines for copying sculpture, and numerous devices unconnected with the steam-engine, several of which he patented. It is curious to recall that Boulton and Watt attempted to secure an act of parliament forbidding the use of high-pressure engines; Watt persisted in the use of steam at low pressure. Watt's claims to be the first discoverer of the composition of water were long and strenuously maintained (see WATER, p. 565).

He retired from business in the year 1800, giving up to his two sons, James and Gregory, his interest in the extensive and prosperous business which Boulton had created at Soho. He showed the same alert and active mind after his retirement. The attic room at Heathfield Hall, his house near Birmingham, where he used to work alone, is still preserved, in its old condition. Here he was perfectly happy, working with his turning-lathe, and amongst his tools and models. In the earlier portion of his life he suffered much from ill-health. He had quickness of apprehension, a powerful memory, and an immense store of well-digested miscellaneous information outside his own domain. In conversation his utterance was slow and unimpassioned, with a quiet, grave humour, while his manners were gentle, modest, and unassuming. He died at Heathfield on 19th August 1819 in his eighty-fourth year. There are many monuments to Watt; the inscription on that in Westminster Abbey is from the pen of Lord Brougham. Watt stands at the head of all inventors, and the honours paid to his memory and to himself in his later years appear to have been deserved by his personal qualities, no less than by the immeasurable benefits which his inventive talents have conferred upon the human race.

See J. P. Muirhead, *Origin and Progress of the Mechanical Inventions of James Watt* (3 vols. 1854), comprising a memoir, letters, and patent specifications; Muirhead's *Life*, abridged from his larger work (1 vol. 2d ed. 1859); Smiles, *Lives of Boulton and Watt*; Williamson, *Memorials of the Lineage of Watt* (1856); Cowper in *Proc. Inst. Mech. Engineers*, Nov. 1883.

Watt, ROBERT, bibliographer and physician, was born the son of a small farmer near Stewarton in Ayrshire in May 1774, and studied for the church at Glasgow University (1793–97). He subsequently studied medicine at Edinburgh, and was licensed in surgery and pharmacy, which arts he practised in Paisley and in Glasgow (1799–1817). At his death (12th March 1819) he was a distinguished physician, accoucheur, and lecturer on the practice of medicine at Glasgow. He wrote medical works on diabetes, consumption, and hooping-cough, and a moral work, *Rules of Life*; but he is best known by his valuable (though far from complete or infallible) *Bibliotheca Britannica* (4 vols. 4to. 1824; see BIBLIOGRAPHY), which orginated in a catalogue (published 1812) of a library he gathered for the use of his students.

Watteau, ANTOINE, was born at Valenciennes, in October 1684, and in 1702 he betook himself to Paris, where for some time he earned a livelihood by the sorriest hack-work for a picture-dealer. He subsequently received instruction from Gillot, and got employment with Andran, the decorator of the Luxembourg, and in 1711 became a student at the Academy. In 1717 he was made a member of the Academy, and became famous as the creator of a new type of art. There is a

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strange contrast between the gaiety of his art and the melancholy of his life constantly overshadowed by ill-health. In 1718 he visited England to consult a certain Dr Meade, then famous, for whom, during his stay, he painted one or two pictures. After his return home his health gradually declined; and on 18th July 1721 he died of consumption at Nogent, near Paris. In virtue of their charming colour and graceful design, the pictures of this master of the Rococo age still enjoy a high vogue, though his reputation as an artist is now but an echo of that which, in his lifetime, he enjoyed. He employed himself chiefly in painting small landscapes, with something of the nature of the *Fête Galante* going on in them—mock-pastoral idylls in court-dress. The largest collection of Watteaus—that made by Frederick the Great—belongs to the German emperor; and many are in the hands of English collectors.

See the *Catalogue raisonnée* of his works by De Goncourt (1875), and the monographs by Cellier (1867), J. W. Mollett ('Great Artists' series, 1883), Vollbehr (Hamb. 1885), Hannover (Copen. 1888), Dargenty (Paris, 1891), and Nantz (Paris, 1891).

Wattle. See ACACIA.

Wattle-bird (*Anchochæra carunculata*), a wattled Honey-eater (q.v.) of Australia, with wattles half an inch long. The plumage is variegated gray, brown, and white, and the flesh is delicious eating. In a Tasmanian species (*A. inauris*) the wattles are over an inch long.

Watt's Dyke. See OFFA'S DYKE.

Watts, ALARIC, was born in London, March 16, 1797, and died there, April 5, 1864. He had four years' schooling at Wye and Ashford in Kent; was an usher at Fulham and Runcorn, and a newspaper editor at Leeds and Manchester; married in 1821 the Quakeress, Priscilla Wiffen (1800–73), a sister of the two Spanish scholars; founded the *United Service Gazette* (1833); and made a great hit by his annual, the *Literary Souvenir* (1824–37). Latterly he was less successful, and in 1854 he was granted a pension of £100. He published two volumes of poetry, but one piece only by him is remembered—the alliterative *jeu d'esprit*, 'An Austrian army awfully arrayed,' &c. The Life by his son (2 vols. 1884) contains some interesting sketches of his contemporaries.

Watts, GEORGE FREDERICK, painter, was born in London in 1820, and sent his first picture to the Academy in 1837, but formed his style during a three years' sojourn in Italy after the old masters, especially of the Venetian school. He attracted public notice by his cartoon of 'Caractacus' sent to Westminster Hall in 1843, and again by pictures of 'Echo' and 'King Alfred' in 1847. He is above all things a poet-painter, but remarkable for his individuality, dignity, extreme correctness in drawing, splendid coloration, and exquisite purity of atmosphere. He has painted many noble portraits (not a few of them the most eminent of his contemporaries) and some fine landscapes; his historical subjects are in the grand dramatic manner, but he is best known by his magnificent pictorial moralities, emblems of profound and subtle import. He sympathised with many of the aims of the Pre-Raphaelite school, but stood quite apart from it. Among his more important paintings—familiar many of them by photogravures or other reproduction, though he has never been a 'popular' painter—are 'Paolo and Francesca' (1848), 'Fata Morgana' (1848), 'Life's Illusions' (1849), 'Love and Death' (1877), 'Watchman, what of the Night?' (1880), 'Hope' (1886). The exhibition of his works at the Grosvenor Gallery (1882), which included one of his admirable sculptures, comprised about half of his life's work. He has executed a fresco of St George and the Dragon in the Houses of Parliament, and a fresco in Lincoln's Inn. He has set apart many of his best works, especially portraits, to be ultimately a gift to the nation.

Watts, HENRY, writer on chemistry, was born in London, 20th January 1815, in 1837 became demonstrator of Chemistry at University College, librarian to the Chemical Society in 1850, and editor of its *Journal* in 1861. He translated Gmelin's *Handbuch der Chemie* (18 vols.) and other chemical works, but is best known by his *Dictionary of Chemistry*, based on that of Dr Ure (5 vols. 1863–68; supplements in 1872–75–81; new and revised ed. by Morley and Muir, 4 vols. 1889 *et seq.*). He died 30th June 1884.

Watts, ISAAC, hymn-writer and divine, was born on July 17, 1674, at Southampton, where his father kept a boarding-school and wrote poetry. At sixteen he was sent to an academy in London kept by Thomas Rowe, an Independent minister. Here his devotion to his studies was so excessive as to permanently injure his constitution. In 1696 he became tutor in the family of Sir John Hartopp at Stoke-Newington, and there he remained six years, acting also as assistant to Dr Chauncy, minister of the Independent Church in Mark Lane, whom he succeeded in 1702. His health was throughout infirm; and in 1712 he was prostrated by an illness so violent that he never thoroughly recovered from its effects. A visit which he paid to Sir Thomas Abney at Theobalds for change of air resulted in his domestication in the establishment till his death, thirty-six years afterwards, on November 25, 1748. As his health permitted he continued to preach and to write. Though hardly over 5 feet high, and feeble physically, he was counted among the best preachers of his time, and his sermons by no means belie this reputation. His theology was marked by a large charity and catholic spirit then uncommon amongst Dissenters. The degree of D.D. was given him by Edinburgh in 1728. His theological works were numerous, but are now quite forgotten. His treatise on *Logic*, long since superseded, was once a text-book at Oxford. But this childless saint and scholar assured the perpetuity of his name by his *Divine and Moral Songs for Children* (1715), which, in spite of many a metrical defect and much hopeless prose, show strength, sanity, and the right simplicity without weakness. And in Dr Johnson's words, 'a voluntary descent from the dignity of science is perhaps the hardest lesson that humility can teach.' His *Horæ Lyricæ* (1706), *Hymns and Spiritual Songs* (1807–9), and *Psalms of David Imitated* (1719) contain nearly 500 hymns and versions, of which many remain amongst the cherished treasures of English devotion. It is enough to name but these: 'There is a land of pure delight,' 'Jesus shall reign where'er the sun,' 'When I survey the wondrous cross,' and 'O God, our help in ages past.' There are Lives by Dr Gibbons, Dr Johnson, Southey, Milner (1834), and E. Paxton Hood (1875).

Watts, THEODORE, poet and critic, was born in 1836 at St Ives in Huntingdonshire. His father, according to the biography of him in Norris's *History of St Ives*, was a solicitor and a naturalist, intimately connected with Murchison, Lyell, and other geologists, a pre-Darwinian evolutionist of considerable mark in the scientific world of London, and the Gilbert White of the Ouse valley. Walter Theodore Watts (for such is his full name) received at Cambridge a somewhat elaborate private education, comprising music, art, and the physical sciences, especially biology. Settling in London, he soon became the centre of a very remarkable literary and artistic company. He is described

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in the introduction to Philip Bourke Marston's collected works, by Mrs Chandler Moulton, the editor, as 'a poet whose noble work won for him the life-long and intimate friendship of Rossetti and Browning and Lord Tennyson, and was the first link in that chain of more than brotherly love which binds him to Swinburne, his house-mate at present and for many years past.' He thus came to exercise a most important influence on the art and culture of the day; but although he has written enough to fill many volumes—in the *Examiner*, the *Athenæum* (since 1876), the *Nineteenth Century*, the *Fortnightly Review*, &c.—he has let year after year go by without his collecting his essays, which, always dealing with first principles, have ceased to be really anonymous, and are quoted by the press both in England and in Germany as his. But, having wrapped up his talents in a weekly review, he is only ephemerally known to the general public, except for the sonnets and other poems that from the *Athenæum*, &c. have found their way into anthologies, and for the half-dozen articles on poetic subjects that he has contributed to the *Encyclopædia Britannica* and the present work. The poems of his which are most generally known are 'The Burden of the Armada' and 'The Ode to Mother Carey's Chicken,' the latter of which has been often reprinted in England and America. The chief note of his poetry —much of it written in youth—is its individuality, the sources of its inspiration Nature and himself, if these sources, indeed, are not one. For he who of all men most has influenced his brother-poets has himself remained least influenced by them. So, too, his prose writings—literary mainly, but ranging also over folklore, ethnology, science generally—are marked as much by their independence and originality as by their suggestiveness, harmony, incisive vigour, and depth and breadth of insight. They have made him a force in literature to which only Sainte-Beuve, not Jeffrey, is a parallel. Mr Swinburne has styled him 'the first critic of our time—perhaps the largest-minded and surest-sighted of any age,' and Rossetti in a published conversation has said the same thing.

See, besides works cited at Rossetti, W. Sharp's *Sonnets of the Century* (1887), preface to *The New Day* of Dr Hake (1890), and A. Miles's *Poets of the Century* (1892).

Waugh, EDWIN, the Lancashire poet, was born January 29, 1817, at Rochdale. As a youth he was apprenticed to a local printer and bookseller, but on the expiration of his apprenticeship he seems to have devoted himself almost entirely to literature. With his removal to Kelsal near Manchester he became one of the most active members of the Manchester Literary Club, of which he was at one time president. His first sketches of Lancashire life and character appeared in the *Manchester Examiner*, and at once attracted friendly attention to the author. Among Mr Waugh's numerous prose writings may be cited his *Factory Folk during the Cotton Famine*, the *Besom Ben Stories* (possibly the best of his humorous pieces), *The Chimney Corner* (a series of exquisite village idylls), and the admirable descriptions of natural scenery in his *Tufts of Heather*, *Irish Sketches*, and *Rambles in the Lake Country*. But it is as a singer rather than as a story-teller that our author will be best remembered. For several years he had been in the habit of contributing dialect songs to various periodicals, and these pieces, first collected in 1859 as *Lancashire Songs*, secured for their author immediate recognition as a poet. Rivalling the Cumbrian poems of Robert Anderson, and comparing favourably with the best work of the rustic followers of Burns, these rude lyrics won the hearts of his countrymen by the power, pathos, and kindly humour with which he paints the homely ways and thoughts of his country-people; indeed few poems enjoy such popularity in Lancashire as Waugh's 'Come whoam to thi childer an' me.' As an expositor of dialect Mr Waugh merits high praise. The nice shades of local *patois*, current in villages separated by only a few miles, are tenderly discriminated, and the idiom is nowhere maintained to the tedium of the general reader, but relieved by brilliant descriptive passages written in Mr Waugh's terse and pure English. Outside his native county Mr Waugh's rendering of dialect is somewhat less happy, and the specimens of the country speech of Cumberland and Ireland, as given in *Jannock* and *Irish Sketches*, can scarcely be accounted a success. In 1882 Mr Waugh became the recipient of a small pension from the Civil List. With failing health he removed to New Brighton, Cheshire, where he died, April 30, 1890, of cancer in the throat. Personally Mr Waugh was the centre of a large circle of friends, who delighted in his genial wit and powers as a *raconteur*. The best edition of Waugh's collected works is that in 11 vols., with Caldecott's illustrations.

Wauke'gan, capital of Lake county, Illinois, on the west shore of Lake Michigan, 36 miles by rail N. by W. of Chicago. It is mostly built on a bluff, 50 feet above the lake. Pop. 5345.

Waukesha, capital of a county, Wisconsin, on Fox River, 19 miles W. of Milwaukee. Pop. 6321.

Waurin, JEHAN DE, an old English chronicler, whose work in six volumes, each divided into six books, embraces the period from the first fabled settlement in Britain to 1471. The *Recueil des Croniques et Anchiennes Istories de la Grant Bretaigne a present nomme Engleterre* has been edited by Sir William and Mr E. Hardy (Rolls series, 5 vols. 1864–91). Vols. i. and ii. were translated, 1864–87.

Wausau, capital of Marathon county, Wisconsin, 210 miles NW. of Milwaukee. It sends much lumber down the Wisconsin River. Pop. 9251.

Wave. When the surface of a sheet of water is disturbed waves are invariably produced. These may vary in magnitude from the huge rollers of the Atlantic to the tiniest observable ripple. The broad characteristic of such wave-motion is that as the waves pass over the surface at a considerable speed the liquid itself simply rises and falls with a slight to-and-fro motion in a steady rhythmic manner. The wave, in short, is a particular state of motion handed on from one portion of the water to another. It is energy, not matter, that is transmitted. In the case of ordinary sea-waves it is not easy to see that gravity is the effective dynamic agent in their propagation. In accordance with hydrodynamic principles the tendency must be for the water at the crest of a wave to be pulled down to the level of the water in the neighbouring trough, and for the latter to be pushed up to the level of the former. Corresponding to this surface oscillation there must be at any point below the surface an oscillation in pressure. Also at any instant the pressure will vary from point to point along a horizontal line drawn in the fluid in the direction in which the wave-motion is being propagated. These conditions obviously imply a definite motion of the particles of the fluid. If we suppose this motion of the fluid itself to be so small that we may neglect the square of its value, we are able to determine mathematically the character of the motion in the simplest type of oscillatory waves sustained by the action of gravity. Two simple cases are usually distinguished according as the length of the wave is great or small compared with the depth of the liquid. In the former case we have the propagation of long waves in shallow water. Each particle of liquid describes an ellipse

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with longer axis horizontal. As the depth increases this ellipse diminishes in size, and becomes more elliptical. At the bottom the liquid simply moves to and fro in a straight horizontal line. The velocity of the wave is equal to the square root of the product of the total depth of the liquid into the acceleration due to gravity, in symbols $\sqrt{gh}$. The shallower the water the more slowly will the waves pass.

In the other simple case we find a type of which the deep-sea wave may be taken as an example. Each particle of fluid describes a circle, which rapidly diminishes in size as the depth increases. The velocity of wave-propagation is given by the formula $v^2 = gl/2\pi$, where l is the wave-length and π is the ratio 3·14159... . Thus, with a wave-length 4π or about 12·6 feet, the velocity of propagation will be 8 feet per second or 5·6 miles per hour. Again, with a wave-length of 100π—a length by no means uncommon with Atlantic rollers after a gale—the waves will travel at 40 feet per second or 27·3 miles per hour. Atlantic waves from 500 to 600 feet long and from 44 to 48 feet high have been observed to take from 10 to 11 seconds to pass. This gives a velocity of 50 or 55 feet per second. The theoretical formula gives 50·6 and 55·4 feet per second respectively. The Hydrographical Bureau of Washington records the observation of a wave half a mile long which took 23 seconds to pass. According to the formula it should have taken 22·7 seconds. These comparisons show that so far as the value of the velocity is concerned the simple theory is very satisfactory.

This theory, which is avowedly an approximation, gives a wave form whose crests are similar to the troughs. Now a glance is sufficient to show that the crests are sharper and the troughs flatter than this similarity would require. Stokes has, however, carried the approximation a step further, and finds that the steeper crests and flatter troughs are quite accounted for; also that the particles are, on the whole, carried forward in the direction of propagation of the wave.

In the case of oscillatory waves the disturbance, as already noted, rapidly diminishes as the depth increases. Thus at a depth equal to one wave-length the disturbance of the water is only $\frac{1}{535}$th of that at the surface; and at a depth of two wave-lengths, only $\frac{1}{286225}$th of that at the surface. With the largest ocean waves the agitation has an inappreciable effect at even moderate depths.

Near a shore-line or beach the to-and-fro motion of water along the bottom must have its effect on the material accumulated there. Signor Cornaglia has made some very valuable observations on the formation of beaches along the shores of the Mediterranean. He finds (as the theory also indicates) that the bottom water under a crest moves in the direction of the wave-motion, and that the water under a trough moves in the opposite direction. A stone or other object lying on the bottom will, as wave follows wave, be subjected to pressures acting in alternate directions. If the bottom is inclined, as in the case of a shelving beach, the shoreward push due to a passing crest is greater than the seaward push when the trough is passing. The seaward push will, however, be aided by the resolved part of the weight of the stone acting down the slope. At a certain depth, depending on the inclination of the slope and on the size of the waves overhead, the landward push will just be balanced by the seaward push together with the resolved part of the weight. In shallower depths, that is, nearer the shore, the landward push will have the advantage, and the effect of the waves will be to carry material up the beach. On the other hand, in greater depths, that is, farther from the shore, the other forces will have the advantage, and the materials will tend to be carried out to deeper water. Thus there exists near to every shore a neutral line or strip, above which sediment tends to move up, and below which it tends to be carried away to greater depths. In the Mediterranean this neutral line lies at a depth of from 26 to 33 feet. Signor Cornaglia shows the importance of this phenomenon in relation to estuaries and harbours, which become silted up if their mouths and openings are on the land side of the neutral line, but remain deep if their outlets are on the sea side of the neutral line.

As oscillatory waves flow in upon a shelving beach they gradually change character. The troughs become flatter, and the crests become sharper. At length the crest begins to curl over, and finally topples as a breaker upon the beach. If we regard these waves as oscillatory waves in shallow water, we see that their velocity should diminish with the depth. Hence there is a tendency for the advancing wave, which, so to speak, strives to keep its original momentum, to be retarded by friction on the bottom. Hence the crest tends to outstrip the lower parts of the wave, and the result is the breaker. It is certain, however, that as the depth becomes smaller and smaller the waves lose their true oscillatory character and become solitary waves or waves of translation.

The solitary wave was discovered and studied by Scott Russell, the eminent engineer. To this class belongs the long wave which accompanies a canal-boat, and which we see traversing the canal when the boat is stopped. The most favourable rate at which a canal-boat can be drawn is when its velocity is such that it rides on the crest of the solitary wave. When this condition is not fulfilled part of the work done by the horse is expended in producing fresh solitary waves. The speed of the wave is measured by $\sqrt{gh'}$, where h' is the height of the crest of the wave above the bottom of the canal. In a canal 8 feet deep the boat's most favourable speed would be a little greater than 16 feet per second, or about 11 miles per hour. Boussinesq and Rayleigh have worked out the theory of the solitary wave, and their conclusions agree very well with the observations made by Scott Russell. For example, the latter observed that when the height of the wave was equal to the depth of the undisturbed liquid the wave began to break; and the theory shows that with this relation of depth and height the water at the crest is moving horizontally with the speed of the wave. One characteristic of this solitary wave is that when it is a crest the water is displaced forward a definite amount and does not return. On the other hand, when it is a trough the water is displaced backward—i.e. opposite to the direction of propagation of the solitary trough. For this reason the solitary wave is also called the wave of translation. It is found that a solitary trough is very unstable; and it is doubtful if a solitary crest can remain permanently of the same form even on a frictionless fluid.

Stationary waves in running water, such as may be seen on any shallow brook with uneven bed, belong to another class of waves. One particular inequality, a large stone for example, will produce one conspicuous wave and a number of smaller ones accompanying it. The conditions of the problem are difficult to state; and very little has been done in the discussion of it. Lord Kelvin has shown that a certain relation between the speed of the water and the average depth determines whether there is a crest or trough formed over the inequality.

With water-waves whose wave-lengths are longer than 1 foot gravity is practically the efficient agent in propagating the wave-motion. But when

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the waves get small another agent comes into play —viz. the pressure due to the Surface-tension (q.v.) of the curved surface of the water. This pressure acts downwards over the convex crest and upwards over the concave trough. Its magnitude increases with the curvature, which becomes greater as the wave-length becomes smaller. Thus the influence of the surface-tension in accelerating the speed of the wave becomes more pronounced as the wave is taken shorter and shorter. When a wavelet becomes so small that the surface-tension is more effective than gravity, it is distinguished by the name of ripple. There is a certain particular wave-length for which gravity and surface-tension have equal effects as regards the speed. Shorter wave-lengths are ripples, longer wave-lengths are waves; and the speed of the wavelet having this critical wave-length is a minimum. All other ripples and waves, whatever be their wave-lengths, travel faster. For any speed greater than this minimum speed two wave-lengths correspond. In other words, for any given wave propagated mainly by gravity there corresponds a ripple propagated at the same speed mainly by surface-tension. These statements are all contained in the following formula which expresses the speed (v) of waves on the surface of fresh water in terms of the wave-length (l): $v^2 = 61{\cdot}4l + 31/l$. The units are the inch and second. The first term on the right is the part due to gravity, the second the part due to surface-tension. The minimum speed (9·34 inches per second) is given when these two terms equal each other, so that the critical wave-length which separates ripples from waves is 0·71 inch. When the wave-length is $2\frac{1}{2}$ inches the speed is $12\frac{1}{2}$ inches per second, instead of 12 inches per second as it would be under the influence of gravity alone. Now the same value of v is obtained if we substitute 0·217 for l in the formula. That is, the *ripple* of wave-length 0·217 inch travels with the same speed as the wavelet of wave-length $2\frac{1}{2}$ inches. It is easy to see from the formula just given that the product of the wave-lengths (in inches) of the ripple and wavelet which move with the same speed must equal $\frac{1}{8}\frac{1}{4}$ or ·505, so that if the one wave-length is given the other can be at once calculated.

A very pretty experiment due to Scott Russell, but first discussed fully by Lord Kelvin, gives a practical demonstration of the fact that to every ripple there corresponds a wave having the same speed. Let a thin rod, dipping vertically in smooth water, be drawn through it at a speed of 10 inches per second or more. In front of the rod a group of ripples advancing with it will be formed, and behind will be seen the corresponding wavelets travelling also with the rod. These combine to produce a beautiful pattern on the surface of the water. If we increase the relative speed of the rod and the water the ripples in front get shorter, and the wavelets behind get longer. On the other hand, a diminution of speed causes the ripples to lengthen and the wavelets to shorten until for a particular speed they are equal in wave-length. For slower speeds wave patterns are not formed.

Any disturbance of the surface of water results in the formation of waves. A stone falling in, or a fish rising, produces a series of wavelets or ripples travelling outwards in widening circles. Of all agents that have to do with the generation of waves wind is, however, the most effective. An almost inappreciable puff of air will produce tiny ripples on an otherwise smooth water-surface. The first production of such ripples must depend upon the variations of vertical pressure accompanying the breeze; but once they are fairly started the momentum of the wind itself will have its direct influence on the wavelets. The power of wind in lashing up the surface of water is shown on a grand scale in every storm at sea.

Besides water-waves, which have been the chief object of discussion in this article, there are numerous other kinds of wave-motion which are essentially involved in many physical phenomena. For example, Sound (q.v.) has to do with waves travelling in elastic media, either as waves of compression and dilatation or as waves of distortion. A similar kind of wave-motion accompanies Earthquakes (q.v.). Then, again, the whole of physical optics is built upon an elaborate theory of wave-propagation, the exact nature of which is yet to be discovered (see LIGHT, POLARISATION, &c.). Maxwell's brilliant theory that the wave-motion which constitutes light is an electric rather than an elastic phenomenon has virtually carried the day; but it remains to find a dynamical explanation of electricity itself, or, at any rate, to conceive an ethereal medium whose fundamental property is a capacity to transmit wave-motions of the kind required. For an account of phenomena depending on the coexistence of wave-motions, see INTERFERENCE. See also HARBOUR.

Waverley. See FARNHAM.

Wavre, a town in the Belgian province of Brabant, 15 miles SE. of Brussels by rail; pop. 7432. Here on the 18th June 1815 there was a fiercely contested battle between the Prussians under Thielmann and the French under Grouchy, in which the Prussians successfully prevented the French from joining Napoleon at Waterloo.

Wax, the name given to some animal and vegetable substances, and even to one or two mineral bodies, which more or less resemble beeswax both in their appearance and in their physical properties. Beeswax and Chinese *pe-la* wax are of animal origin: Carnauba palm-wax and myrica-wax are vegetable products; and ozokerite (see BITUMEN) is an example of mineral wax. The true waxes differ from fats in not yielding glycerine when they are made into soaps with alkalies.

Beeswax is secreted by bees, and of it they build the walls of the cells of their comb. When this is drained of honey it is melted in boiling water, and the wax which floats on the surface is collected in the solid state when the water cools. Raw beeswax is of an impure yellow colour, so that for many purposes it requires to be bleached. Its fracture is finely granular, and it has a peculiar glistening appearance when rubbed which, when seen in other bodies, is called waxy. The melting-point of beeswax varies from about 139° to over 146° F., and its sp. gr. is ·960. It is soluble in ether, turpentine, benzole, and some other liquids, but not in alcohol. It contains about 85 per cent. of *myricin*, a compound of one of the higher ethers of the ethyl series with palmitic acid. Myricin is a crystalline fatty body melting at 162° F., and having the formula $\left.\begin{matrix} C_{16}H_{31}O \\ C_{30}H_{61} \end{matrix}\right\}O$. It differs from ordinary fats by yielding on saponification myricyl alcohol, a crystalline fatty body, in place of glycerine. *Cerotic acid*, $C_{27}H_{54}O_2$, is also present in beeswax to the extent of about 12 per cent., and generally in the free state. This acid is dissolved by boiling alcohol in which the other bodies composing wax are insoluble. As both myricin and cerotic acid are crystalline and brittle, and melt at higher temperatures than wax itself, the tenacity and plastic character of the latter is ascribed to the presence of a comparatively small quantity of a softer substance named *cerolein*, which does not seem to have been as yet thoroughly investigated. *Melissic acid* ($C_{30}H_{60}O_2$) was first prepared by Brodie from the myricin of beeswax, in which it has lately been

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found in the free state. With one exception it is the highest known member of the fatty acids. It fuses at 194° F. (90° C.).

Beeswax is bleached by dividing cakes of it into ribbons, which are spread on canvas, kept moist and exposed to sunshine. The ribbons are turned over at intervals, and occasionally sprinkled with water. After a first bleaching the wax is melted, formed once more into ribbons, and again exposed to the sun's rays. A third treatment of the same kind is usually required. Only solar bleaching will suit when it is to be used for candle-making, and for this purpose the wax also requires a previous treatment with acid. Wax can, however, be bleached with chemical agents. Candles of this material cannot be made, like those of stearin or paraffin, in moulding machines, since they do not part freely from the moulds. They are manufactured by first pouring melted wax on wicks arranged round a hoop, and when they have reached the proper thickness they are rolled in the plastic state on a marble slab. Candles of beeswax, owing to its greater hardness, have less tendency to 'gutter' than those made of stearin or paraffin. Beeswax has also a pleasant odour. By itself it makes by far the best carriage candles, and when these are made of other materials beeswax is sometimes mixed with them. But its high price limits its use for such purposes. It is employed for waxing floors of polished wood, as an ingredient in making some varnishes, for making lithographic crayons, and as a resist in printing patterns on calico.

Wax was of importance to the ancients for writing-tablets (see WRITING), the writing produced by the sharp end of the stylus being, when it had served its purpose, obliterated by the other end. The art of modelling figures and portraits in wax dates from prehistoric times. Beeswax was used for this purpose by the ancient Egyptians. The ancient Greeks practised the art with great skill at least 300 years B.C., and developed the method of casting in bronze by means of wax now known as *cire perdue* (see FOUNDING, Vol. IV. p. 752). Wax was the material in which the patterns or models for both large and small works of art in bronze were usually finished in ancient and Renaissance times, and was so employed that it might melt away in the casting of them. The Romans were wont to have wax portraits of their ancestors set up in their entrance-halls as evidence of ancient pedigree. Wax was also the material with which the colours for *encaustic* painting practised by the ancients were made up. The remarkable portraits, believed to have been executed in the earlier centuries of our era, which were discovered by Dr Flinders Petrie at Fayyûm in Egypt, were painted with pigments laid on with melted wax. A modern kind of encaustic (see MURAL DECORATION) is sometimes called *wax-painting*. Wax and other images were used with evil intent in Magic (q.v.). In the 14th and 15th centuries sculpturing in wax, or cero-plastics, was practised by artists of good standing, who have left mainly figures in low relief or statuettes. But Vasari praises a large portrait statue of Lorenzo de' Medici by Verrocchio and Orsino, of which the framework was wood, clothed with real garments, the face, head, and hands being of wax. But no skill evades the lividness of the flesh or the ghastly stare of the glass eye; and wax-portraiture has been abandoned by artists proper, and left to the skilful workmen who manufacture portrait figures of royal personages, popular characters, and distinguished murderers for shows, perambulating or permanent. Of the latter that of Mme. Tussaud (q.v.) is the best known. Wax-modelling has also a humbler sphere in the making of one kind of artificial flowers, composed of thin leaves of coloured wax, surface painted in detail with proper pencils, and artificial fruit, and in producing tailors' dummies, as well as anatomical models and pathological specimens; and embryological models, now much used in the teaching of zoology, are usually made of wax.

Beeswax is produced in nearly all the temperate and tropical countries of the world. Large quantities are obtained from southern Asia and North Africa. East Indian wax mostly comes from hilly regions, the bees which produce it being wild or semi-wild. The amount of beeswax annually imported into the United Kingdom is about 50 tons. Its price in the bleached state is £7 per cwt.

Chinese wax is produced by *Coccus ceriferus*, Fabr. (*Coccus pe-la* of Westwood), living on the ash-tree *Fraxinus chinensis*, and belonging to the same genus as the lac-insect (see LAC). This beautiful substance resembles spermaceti in general appearance. It has a highly crystalline structure, and is very hard for a wax, its melting-point being 180° F. Chemically it consists chiefly of ceryl cerotate. Although this should be an excellent material for making candles, their manufacture from it presents some points of difficulty. It is perhaps owing to this, still more to its high price, that the wax has never become an article of much commercial importance in Europe. But it is so in China and Japan, where it is used for making candles, or for coating candles of inferior materials, and also for sizing paper and textiles. The average annual production in China is valued at £600,000. The price per cwt. is £7, 10s.

A wax similar to the Chinese pe-la is produced in Japan by an insect which is probably another species of coccus living on *Ligustrum Ibota*. It is, however, not abundant enough to be of industrial importance.

Spermaceti.—See this head.

Carnauba wax is found in thin films on the leaves of a Brazilian palm (*Copernicia cerifera*). It consists chiefly of myricyl cerotate and myricyl alcohol. Its melting-point is 185° F., rising to about 195° F. when long kept, and its specific gravity is about ·99. This substance is made into candles to a large extent in Brazil, but it is only used in limited quantities in the candle manufacture in England. A small proportion of it mixed with other candle-making materials is useful in destroying the 'mottle' which some of these have a tendency to show. Carnauba wax is used to adulterate beeswax, and on the Continent to mix with such substances as stearin and cerosin to make cheap 'wax' candles for church purposes. The imports of Carnauba wax into England, though not large, are increasing—2500 bags in 1891, and much more in 1892. The price is £3 per cwt.

From the stem of *Ceroxylon andicola*, the wax-palm of the Andes, a resinous exudation is obtained, about one-third of which consists of a wax used for making candles (see PALM). A similar substance is produced by *Klopstockia cerifera*, another South American palm.

Japan Wax is obtained from the fruit of several species of Rhus, of which *R. succedanea* is the most important, but *R. vernicifera* and *R. sylvestris* also yield it. The berries contain the wax between the kernel and the outer skin. The raw wax is of a greenish colour, and is cut into strips and bleached white by exposure to the sun. This wax is mostly composed of palmitin, and is therefore rather a fat than a true wax. Its melting-point varies from 124° to 128° F. It is important as a candle-making material in Japan, although but little used for this purpose in England. It has a rather unpleasant smell. Japan wax is an ingredient in some polishing mixtures for furniture and leather, and it is

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also employed to make a transparent castor-oil pomade. The imports of it into England, amounting to 625 cases in 1892, are very variable. The price per cwt. is £1, 18s.

Myrtle-berry Wax.—The berries of several species of Myrica are coated with a waxy substance. In the United States the wax from *M. cerifera*, which is a rather soft greenish substance, with a melting-point of 123° F., has been much used (more or less mixed with beeswax) for candle-making. It consists most largely either of free palmitic acid or of palmitin with some myristin. *M. cordifolia* of South Africa and other species found in South America yield myrtle-wax (see CANDLEBERRY).

Paraffin-wax.—Solid paraffin is so called. When of good quality for candle-making, it is a comparatively hard, pure white substance resembling beeswax, but rather more translucent. It has neither taste nor odour, and is not acted on by either alkalies or acids, with the single exception of nitric acid, which slowly attacks it, but only when this acid is at or near its boiling-point. Paraffin dissolves with the aid of heat in various naphthas (those from shale, petroleum, and coal-tar), in turpentine, ether, bisulphide of carbon, and to some extent also in alcohol and fatty oils. Paraffins are found in commerce with various melting-points, but all are mixtures of hydrocarbons belonging to the marsh-gas or paraffin series (see HYDROCARBONS). Those melting between 70° and 118° F. have a crystalline structure and are classed as soft paraffins. Such as melt between 115° and 150° F. (about the highest that can be made) are called hard paraffins, and in these the crystalline texture disappears. The hard are less easily dissolved than the soft kinds.

Besides its extensive use in candle-making, paraffin is employed for a great many purposes in the arts, such as for laundry purposes along with starch, for dressing textile fabrics and for rendering them waterproof, in the manufacture of perfumes from flowers, and to give a finish to certain articles made of wood, bone, or leather. In the United States it has been extensively consumed as a chewing-gum, and has been tried with some success as a preservative of fruit. Soft paraffin is largely bought for dipping matches. Paraffin purified without the use of acid has recently come into extensive use as an insulator by electricians. See PARAFFIN, CANDLE, and HYDROCARBONS.

Sealing-wax (q.v.) is not now made of wax at all.

Wax-bill (*Estrelda astrilda*), a well-known small South African bird, much in repute in other lands as a cage-bird, is about 4 inches long, and has a bright red bill, the translucency of the horny covering giving it a waxy appearance.

Waxcloth. See FLOORCLOTH.

Wax Insect. See WAX.

Wax-myrtle. See CANDLEBERRY.

Wax-palm. See WAX.

Wax-plant. See ASCLEPIADACEÆ.

Wax-tree (*Vismia*), a genus of plants of the natural order Hypericaceæ, having a five-parted calyx, and five petals, generally covered with soft hairs on the inside. All the species yield a yellow resinous juice when wounded, which, dried, has similar properties and appearance to gamboge, and in commerce is named American gamboge. The species are natives of tropical America.

Wax-wing (*Ampelis*), a genus of small passerine birds in which the secondary quills of the wings, and sometimes other feathers of wings or tail, are tipped with red horny appendages like sealing-wax. There are three species: the Bohemian Wax-wing or Chatterer (*A. garrulus*), found in the northern hemisphere of both old and new worlds; the Japanese Wax-wing (*A. phœnicoptera*); and the

Bohemian Wax-wing (*Ampelis garrulus*).

smaller Caroline Wax-wing or Cedar-bird (*A. cedrorum*).

Waxy Degeneration (also called *amyloid* or *lardaceous* degeneration) is a morbid process in which the healthy tissue of various organs is transformed into a peculiar substance, allied in its chemical composition to albuminous substances. Organs affected by this degeneration have a certain resemblance in consistency and physical character to wax. They may be cut into portions of the most regular shape, with sharp angles and smooth surfaces; and the thinnest possible slices may be removed by a sharp knife for microscopical examination. Such organs are abnormally translucent, increased in volume, solidity, and weight. Usually the first parts affected by this degeneration are the small blood-vessels, the middle or muscular coat being first changed. Subsequently the adjoining tissues become similarly affected. When a solution of iodine is brought in contact with such tissues, a deep reddish-brown colour is produced; and this colour is alone a sufficiently characteristic test. Although amyloid degeneration is common to many tissues and organs, the parts most frequently affected are the spleen, liver, kidneys, lymphatic glands, and intestines. Waxy degeneration is very rarely met with as a primary condition. It is almost always the sequel to some chronic wasting disease, and is particularly associated with profuse and long-continued suppuration, as in strumous disease of bone, diseases of the lungs, kidneys, or intestines, with much purulent discharge; and with advanced constitutional syphilis. It can thus rarely be regarded as itself the cause of death, though it may materially hasten the fatal issue. No treatment is known to be of any avail; but when the degeneration is not very far advanced, it may gradually disappear if the suppuration or other morbid condition which has led to its development is arrested.

Wayland, the Smith (A.S. *Veland*; old Norse, *Völundr*; Ger. *Wieland*), a hero of German saga, who was originally a kind of demi-god in popular mythology, with points of identity with the Greek Hephæstus and Dædalus. He was son of the sea-giant Wade, a nephew of King Wilkinus, and was first bound apprentice to the famous smith Mimir. Then he was carried across the sea to the dwarfs, whom he soon surpassed in their own science. He dwelt a long time in Ulfdaler along with his two brothers, Eigil, the best archer, and Slagfidr, and here they met three swan-maidens, with whom they lived for seven years, until these flew away to follow battles as Walkyries. Afterwards Wayland came

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to King Nidung, who cut the sinews of his feet and put him in prison, for which he revenged himself by putting the king's two sons to death, and violating his daughter Baduhild, who afterwards gave birth to Wittich. Wayland then flew away in a feather-robe, which he himself manufactured, and which his brother Eigil had tried first, only to be precipitated to the ground. By skilfully piecing together the various old legends, Simrock has produced the Saga of Wayland as a whole in his poem *Wielant der Schmied* (1835), and in the 4th part of his *Heldenbuch* (1843). The legend is often alluded to in Scandinavian, Anglo-Saxon, English, and German poems, and even old French poems tell of Galant the smith. Wayland Smith's Cave, a two-chambered megalithic monument, near the White Horse in Berkshire, is immortalised in *Kenilworth*.

See Depping and Michel, *Veland le Forgeron* (1838); Grimm's *Deutsche Mythologie;* Müller, *Mythologie der deutschen Heldensage* (1886); and Golther, *Die Wielandsage* (*Germania*, vol. xxxiii.).

Wayne, ANTHONY, an American general, was born at Easttown, Pennsylvania, January 1, 1745, the grandson of a Yorkshireman who commanded a body of dragoons at the battle of the Boyne, and emigrated to Pennsylvania. Raising in 1776 a regiment of volunteers, he was appointed colonel of it, and sent to Canada, where he covered the retreat of the provincial forces at Three Rivers. He commanded at Ticonderoga until 1777, when he was made brigadier-general, and joined Washington in New Jersey. He fought bravely at Brandywine; led the attack at Germantown; captured supplies for the distressed army at Valley Forge; distinguished himself at Monmouth; was defeated at Paoli; but achieved his most brilliant victory in the carrying of Stony Point with the bayonet at midnight, July 15, 1779. His courage and skill saved Lafayette in Virginia in 1781; and he aided in the siege of Yorktown. At the close of the war, rewarded by popular enthusiasm, and having, by his dash and audacity, acquired the sobriquet of 'Mad Anthony,' he retired to his farm in Pennsylvania, subsequently took up a tract of land granted to him in Georgia, and sat in congress for a few months. Appointed, on Washington's recommendation, in 1792 general-in-chief of the army, he next year commanded a successful expedition against the Indians of the north-west, founded Fort Wayne, and in 1795 signed a treaty with the Indians by which the United States acquired a large addition of territory. He died at Presque Isle (now Erie), Pennsylvania, 15th December 1796.

Way, RIGHT OF. See RIGHT OF WAY.

Ways and Means. See PARLIAMENT, p. 774.

Wazan, an inland town of Morocco, picturesquely situated on the steep northern slope of a two-peaked mountain, in the hill-country 90 miles SE. of Tangier; pop. 20,000. It is a sacred city and a place of pilgrimage, the headquarters of the Grand Shereef. The principal buildings are the great mosque and the tombs of a long line of shereefs. The trade is, as elsewhere in Morocco, mainly in the hands of the Jews. See MOROCCO; also Watson, *A Visit to Wazan* (1880); and Harris in *Blackwood's Magazine* (1892).

Wazirabad, a town of the Punjab, 21 miles N. of Gujranwala by rail; pop. 16,462.

Waziris, an Afghan hill tribe, inhabiting the highlands between the Kuram and the Gomul passes, on the western frontier of the Punjab. See the map at AFGHANISTAN.

Weald. See KENT.

Wealden Beds. See CRETACEOUS SYSTEM.

Wealth. See CAPITAL, POLITICAL ECONOMY, VALUE; and for the national wealth at various dates, GREAT BRITAIN.

Weaning. See INFANT.

Wear, a river of Durham (q.v.), 65 miles long. See also SUNDERLAND.

Weasel (*Mustela vulgaris*), a common carnivore belonging to the same genus as the marten, sable, polecat, mink, and stoat. It is widely distributed throughout Europe, northern and central Asia, and the northern parts of North America. The body of the male is about 8 inches in length, the tail 2½ inches; the female is somewhat smaller. The colour of the upper parts is reddish brown, of the under parts pure white. In northern regions

Weasel (*Mustela vulgaris*).

and in very cold winters the weasel occasionally becomes pure white, just as the stoat becomes the white ermine. Like related species, the weasel is characterised by courage out of proportion to its size, by agility and wariness, and by pertinacious blood-thirstiness. It feeds on rats, mice, voles, moles, and frogs, but may also destroy young rabbits and birds. Often the blood of the victim is sucked and the brain eaten, or the body may be dragged home and left till it becomes semi-putrid. In its hunting it is most persevering, keen in scent and sight; it will take to the water after the water-vole, or climb to a bird's nest; it usually sleeps during the day, and is most active at night. Like many of its relatives it bites severely and has a disagreeable smell. A nest of dried leaves and moss is made in a sheltered hole in the ground or in a tree trunk, and there in spring the litter of four to six young are reared. Against hostile intruders the mother defends her offspring to the death. The fur is sometimes used, but the animal is too small to be commercially important.

Weather. See METEOROLOGY.

Weathering. See DENUDATION.

Weaver-bird (*Ploceidæ*), a family of passerine birds numbering between 200 and 300 species, which bear considerable resemblance to the finches, and are, indeed, often spoken of as such. The name has reference to the remarkable structure of the nests of many of these birds, which are woven in a very wonderful manner of various vegetable substances, and are objects of great interest. The Ploceidæ are natives of the warmer parts of Asia, of Africa, and of Australia; none being found in Europe nor in America. They are small birds, with a strong conical bill, the ridge of which is slightly curved, the tip entire. The wings are pointed or rounded, the first quill remarkably short, and the males of many species have a distinct summer and winter plumage, the former acquired by moulting some of the feathers. This is the case in the genus Pyromelana, for example, in which the males in full plumage are adorned with the most brilliant yellow, orange, or scarlet, set off by velvety black. They are often called 'bishops;' and the species represented is yellow above and black below, with brownish wings and

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tail, when 'in colour' as shown. There is great diversity in the form and appearance of the nests constructed by different species. One of the best-known species is the Baya (q.v.) of India. Many of the other weaver-birds construct nests pretty much on the same plan with this—pouches elongated into tubes, entering from below; those of some are kidney-shaped, and the entrance is in the side. They very generally suspend their nests in the same way from the extremities of branches, and often prefer branches which hang over water, probably as affording further security against monkeys, squirrels, snakes, and other enemies. Social habits are very prevalent among them, and many nests of the same species are often found close together. Some of them attach the nest of one year to that of the year preceding, as the *Nelicurvixes nelicourvi* of Madagascar, which sometimes thus makes five nests in succession, one hanging to another. Some of the African species build their nests in company, the whole forming one structure. Thus the Social or Republican Weaver-bird of South Africa (*Philhetærus socius*), often called Social Grosbeak, constructs a kind of umbrella-like roof, under which 100 to 200 nests have been found, the nests like the cells of a honeycomb, and arranged with wonderful regularity. An acacia with straight smooth stem, such as predaceous animals cannot easily climb, is often selected by the bird-community. When the situation is chosen, the birds begin by constructing the roof, which is made of coarse grass, each pair afterwards building their own nest, which is attached to the roof. As new nests are built every year, the weight of the structure often becomes so great as to break down its support. The Red-billed Weaver (*Textor panicivorus*) is a large species of the weaver-bird group, which is commonly seen in South Africa accompanying herds of buffaloes, and feeding on the bots and other insects which infest them, alighting on their backs to pick them out of the hide. The bird is often of great use to the buffalo in another way, by giving warning of the approach of an enemy. The Whydah Birds (q.v.) likewise belong to the group of Ploceidæ; and a large number of (usually) small seed-eating birds, commonly imported as pets, are referred to this family, such as Avadavats or Amadavats (*Estrelda amandava*), Waxbills (Pytelia), Mannikins (Munia—not to be confused with the Manakins, i.e. Pipridæ), and the well-known 'Java Sparrow' (*Munia oryzivora*), of which there is a white domestic variety. The 'Bengalese' of bird-dealers are white and pied varieties of a Mannikin (*Munia striata*) domesticated for centuries in Japan; and many other Ploceidæ will breed, more or less freely, in captivity.

Baya Weaver-bird and Nest (*Ploceus baya*).

Weaving is the art of forming a web or cloth by the intersecting of two distinct sets of fibres, threads, or yarns. The one set of yarns which pass in a longitudinal direction from end to end of the web is called the warp; the yarn which crosses and intersects the warp at right angles is called the weft. Textures made by knotting, twisting, and knitting are distinguished from woven fabrics by the fact that the yarns in these proceed in the same direction or have similar functions, while in knitting one continuous thread alone is used. The art of weaving, even in its simplest form, demands a certain amount of manual dexterity combined with some mechanical skill; and therefore, although one of the most ancient and fundamental of human industries, its practice implies some amount of knowledge and civilisation. It is, however, a universal art, and the textile skill of any people has in all ages been a measure of their culture and advancement. Indisputably, also, next to the industries connected with the production of food, those related to the manufacture of cloth are the most important of all arts, and the inventive genius, patient skill, knowledge, and taste which have been lavished on cloth-making have been, beyond all measure, greater than have been devoted to any other range of industries.

Weaving in general implies the preparation of yarns by spinning; but in making haircloth, woven wire, and some kinds of matting yarns are not employed. The simplest form of weaving is that employed in making the mats of uncivilised nations. These consist of single untwisted fibres, arranged side by side to the width required, and of the length of the fibres themselves, which are tied at each end to a stick, which is so fixed as to keep the fibres straight, and on the same plane, as in fig. 1. Then the weaver lifts up every other of these longitudinal threads, and passes under it a transverse one, which he first attaches by tying or twisting to the outermost fibre of the side he commences with, and afterwards in the same way to that on the other side, when it has passed through the whole series.

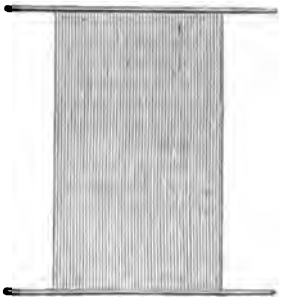

Fig. 1.

Hand-loom.—But all weaving proper is done in a loom, which may be a very simple and primitive apparatus, or it may range upwards in complexity of mechanical contrivance and delicacy of adjustment to one of the greatest triumphs of human ingenuity. In the simplest operation of weaving it is necessary to pass one set of threads transversely through another set, divided into two series, working alternately up and down, so as to receive the transverse threads in passing, and interlock them, forming thereby a united surface out of the threads. The loom is made to assist the weaver in this operation after the manner shown in fig. 2: A, A, A, A is the frame of the loom, and is of no other use than to hold the working-parts in their proper position. At each end of the frame a roller is placed, B, C, so that they will readily turn on their axes; and from one to the other the threads of the warp are attached, and kept tight by the weights *b*, *b*. The warp-threads are wound round the roller B, the *beam* or *yarn-roll*, only as much of each thread being left unwound as will reach to the other roller C, the *cloth-beam*, to which the ends are fastened, and upon which the cloth is wound as it is woven.

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The next step is to divide the warp-thread into two equal sets by raising up every alternate one, and inserting between them a smooth rod of wood,

Fig. 2.

to prevent them entangling or returning to their former position. This separation takes place before the final fixing of the ends of the threads to the *cloth-beam*, because, previous to that, each thread must be passed through a small eye or mail in a perpendicular thread called the heald, which hangs down from the rod A in fig. 3 (in which only six heald-threads and six warp-threads are shown, for the sake of rendering the action clearer). There are always two sets of healds in the simplest form

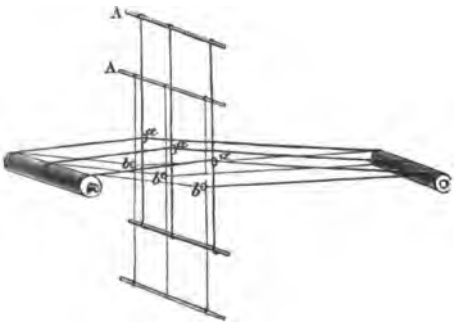

Fig. 3.

of loom, and the threads of the warp are divided alternately by the mails of each heald, so that if one heald is raised it lifts every alternate thread of the warp, and if the other is depressed it pulls down the opposite set of threads; thus, in fig. 3, the three threads of the warp are seen to pass through the three upraised threads of one heald by the loops *a*, *a*, *a*, and the three remaining threads of the warp pass through the depressed healds by their loops *b*, *b*, *b*; the united action of the two healds opens a space between the two sets of warp-threads. This space is called the shed, and through it is thrown the shuttle which carries the thread of the weft; when the weft has passed through, the healds are reversed, and the lower warp-threads now become the upper ones. The threads, after each intersection, are driven up tight by the reed, which is a narrow frame with transverse wires set sufficiently far apart for two or more threads of warp to pass through each; it hangs to the frame called the batten (fig. 1, D). The movement of the batten is produced by the hand of the weaver, whilst that of the healds is readily effected by the treadles E.

At each end of the batten is a shuttle-box, in either of which the shuttle rests when the loom is not in operation. The shuttle of the form seen in fig. 4 is usually made of boxwood, its ends shod with iron. The middle part is hollowed out into a small box, open on the upper side. In

Fig. 4.

this box the bobbin, on which the yarn or thread is wound, is placed, with its two ends on pivots, admitting of its being turned by the slightest strain on the yarn; the end of the yarn passes through a hole in the side of the shuttle, as seen in fig. 4. Between each shed the shuttle is projected by the agency of the picker, moved by the picking-stick held in the right hand of the weaver, along the shuttle-race between the shed-warp from shuttle-box to shuttle-box, and the beating up of the thread left by the shuttle completes one pick of the loom. When coloured patterns are being produced, or when for any reason more than one kind of weft must be frequently interchanged, a number of shuttles corresponding to the varieties of weft must be used. In such case a compound shuttle-box containing as many compartments as there are kinds of weft is required, and a mechanism is applied to the loom for bringing any particular shuttle into line at the time it is needed.

Power-loom.—But into the manifold devices by which the loom has been brought to the perfect condition it has attained it would be impossible here to enter. The ordinary hand-loom, while fully exemplifying all the principles of weaving, is now, for nearly all purposes, superseded by the power-loom. Automatic weaving was substantially the invention of the Rev. Edmund Cartwright (q.v.), who himself thus graphically narrates the course of his experiments:

'It struck me that as in plain weaving, according to the conception I then had of the business, there could be only three movements which were to follow each other in succession, there would be little difficulty in producing and repeating them. Full of these ideas, I immediately employed a carpenter and smith to carry them into effect. As soon as the machine was finished I got a weaver to put in the warp, which was of such material as sail-cloth is usually made of. To my great delight a piece of cloth, such as it was, was the produce. As I had never before turned my thoughts to anything mechanical, either in theory or practice, nor had ever seen a loom at work, or knew anything of its construction, you will readily suppose that my first loom must have been a most rude piece of machinery. The warp was placed perpendicularly, the reed fell with a force of at least half a cwt., and the springs which threw the shuttle were strong enough to throw a Congreve rocket. In short, it required the strength of two powerful men to work the machine at a slow rate, and only for a short time. Conceiving in my great simplicity that I had accomplished all that was required, I then secured what I then thought a most valuable property by a patent, 4th April 1785. This being done, I then condescended to see how other people wove, and you will guess my astonishment when I compared their easy mode of operation with mine.

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Availing myself, however, of what I then saw, I made a loom in its general principles nearly as they are now made, and it was not till the year 1787 that I completed my invention, when I took out my last weaving patent, August 1 of that year.'

As first put on the market, the power-loom was a cumbrous and clumsy machine, which competed with much difficulty against the hand-loom. But by degrees various adaptations and accessories were added to the loom, which enormously increased its efficiency, until it attained that swiftness and certainty of action, and that power of producing all variety and quality of work, which now characterise it, and go to make it the most marvellous of all mechanical combinations. In fig. 5 is seen the skeleton of a power-loom divested of its working-

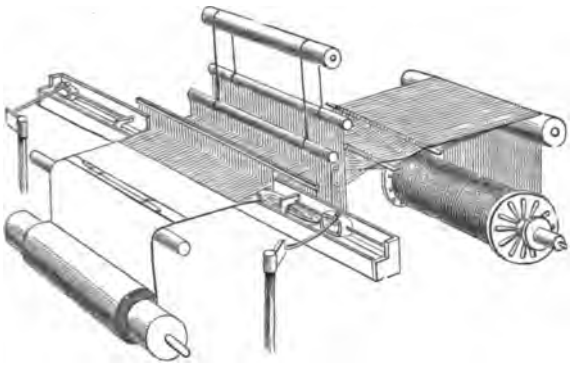

Fig. 5.

parts, in which there is necessarily great variety. The whole of the complicated series of motions is invariably derived through the crank-shaft which revolves under the web.

Loom-mounting.—Before the weaver is in a position to proceed with the formation of the simplest of webs, a number of most important preliminary operations are necessary. These are embraced under the general name of loom-mounting, and include, in the case of warps, the warping, sizing, beaming, healding, and sleying of the yarn. Warping consists in bringing together and arranging in parallel order and in uniform length the number of threads which are required for the breadth of web to be formed. Sizing or dressing is an operation in which the warp yarn so assembled is treated with a glutinous or pasty compound to give the threads increased compactness and tenacity. Beaming consists in spreading the warp uniformly over the warp-beam, the width of the web to be made, and in rolling it around the beam in a regular manner, keeping the threads parallel and in straight order. Healding or drawing-in is the most important of all operations in loom-mounting, or indeed in weaving, for on it the whole nature of the weave depends. In the case of the simplest of all weaves, the making of plain or tabby cloth, only two heddles or heald-shafts are required in the loom, and the warp is drafted in alternate threads through the mails or loops in each shaft. Thus the odd threads, 1, 3, 5, 7, &c., are passed in orderly succession through No. 1 shaft, and the alternate 2, 4, 6, 8, &c. go through shaft No. 2. In this way the warp is divided into two equal quantities. After being drafted through the healds, the warp is passed between the splits or dents of the reed, two, three, or four threads being carried in each split, according to the size of reed and width of web. It then only remains to carry the warp over the breast-beam, attach the ends to the piece-beam, and the operation of weaving may be begun.

Weaves.—With two shafts of healds in the loom it is possible only to produce a plain web, and no variation of pattern can arise except from the introduction of stripes by the use of coloured warps or of checks by using also different coloured wefts. A section of plain cloth is seen in fig. 6.

Fig. 6.

When more than two shafts of healds are mounted in the loom, therewith begins the possibility of variation. With three shafts a simple twill can be produced, in which the weft flushes or passes over one and under two warp-threads alternately, thereby producing a kind of diagonal furrow, which runs from edge to edge of the cloth. In this simple weave the warp-threads are equally divided among the three shafts, and in regular succession two are raised while one is depressed to form the shed. Viewed transversely, this twill is shown in fig. 7. From this point upwards the possibility of combination and variation with the use of additional shafts of healds increases enormously. Thus with four shafts many combinations, regular and irregular, may be formed, the simplest and most common of which is known as the Cassimere twill, in which two weft-threads flush over and under two warp-threads alternately in a diagonal direction. When the number of shafts exceeds four it becomes possible to obtain a sateen weave such as is the basis of figured damasks and similar textures. In weaving a sateen only one shaft of healds, whatever number there may be in the loom, is depressed at each pick; consequently the warp flushes smoothly over the weft, giving the cloth a smooth feel and lustrous appearance, especially in fine linens and silks. The production of figured damasks depends on the combination of plain and sateen weaves, the effect in silks being heightened by the use of different colours also. But for the production of a

Fig. 7.

complete pattern of any considerable dimensions a large number of picks or shots of the shuttle are needed, and for each pick there is a different combination of warp-threads in the shed. Now the number of heald-shafts it is possible to mount in a loom is limited, and besides it is impossible for a hand-loom weaver to operate more than twelve or sixteen treadles, and each shaft of healds requires a separate treadle. It is only very small and simple figured designs which can be completed in that number of picks; and when the separate sheds of warp number hundreds and even thousands it is obvious that some other means must be devised for obtaining the sheds than can be secured by healding. By means of a mechanical attachment called a witch or dobbie-frame, it becomes possible to actuate up to about forty-eight sets of healds by a single pair of treadles, but beyond that number of combinations healds are not used. For all complicated patterns each warp-thread is passed through an independent suspended loop or mail, and thus it becomes capable of entering into an endless variety of combinations of sheds. Before the invention of the Jacquard apparatus the weaver had the difficult and tedious task of tying together the combinations in each separate shed of

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his pattern, an operation called 'tying the harness,' and these sheds were attached to a 'draw-boy' apparatus, by which they were mechanically operated in their proper sequence.

Jacquard Loom.—The great invention of Jacquard entirely obviated the tedious task of harness-tying, and so simply effected what was formerly a difficult, complex, and tedious operation that now the most varied and extensive pattern can be woven with as much ease and rapidity as a piece of plain cloth. The apparatus was invented in 1801 by Joseph Marie Jacquard (1752–1834), a native of Lyons, who, stimulated by reading an account in an English newspaper of the offer of a premium for any person who should invent a machine for weaving nets, set his wits to work to improve the existing machinery for weaving. The reception of his great invention by the public was most dispiriting, for, though Napoleon rewarded him with a small pension, the silk-weavers themselves offered such violent opposition to its introduction that on one occasion he narrowly escaped with his life, and his machine was broken up by the body of men who, under the title of Conseil des Prud'hommes, were appointed to watch over the interests of the Lyonnese traders. But on the spot where the machine was publicly destroyed a statue now stands, to show the gratitude of a more enlightened generation.

The merit of the invention was too great to admit of its being long suppressed, and when its value was once fairly recognised it effected a complete revolution in the art of weaving, especially in the finer kinds of figured silk fabrics. The Jacquard apparatus can be adjusted to almost every kind of loom, its office being merely to direct those movements of the warp-threads which are required to produce the pattern, and which previously were effected by the weaver's fingers. The warp-threads are each (as in the common weaving process) passed through a small loop in the lifting-thread, so as to be raised by means of the treadles, which act directly upon the lifting-bars; these lifting-threads (fig. 8, *i*, *i*, *i*, *i*, *i*) are attached to certain wires in

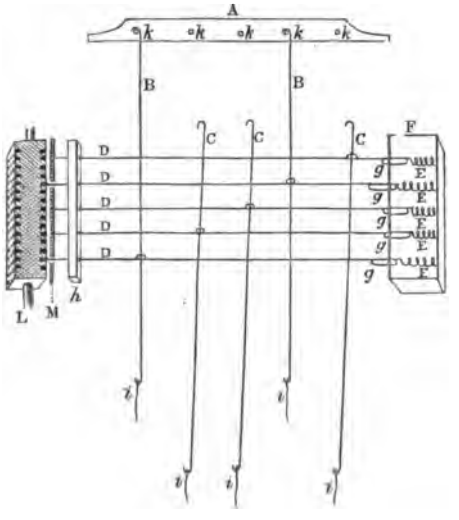

Fig. 8.

the Jacquard apparatus, which form a rigid continuation ending in a hook, which, when nothing interferes, is caught and raised by each upward motion of the lifting-bar; thus, A is the lifting-bar, and it has five projections (*k*, *k*, *k*, *k*, *k*), upon which the hooks of the wires catch when in a straight position, as at B, B, but which miss them if they be thrown out of the perpendicular, as at C, C, C. There are only five of these wires given, to prevent confusion, but practically there must be one for every thread of the warp—i.e. one for every thread in the width of the cloth to be woven. Each of the lifting-wires passes through a horizontal needle placed at right angles, D, D, D, D, D, which has a loop formed for the purpose, thus, at *f* (fig. 9). This needle passes freely through an

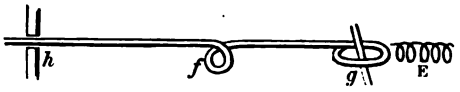

Fig. 9.

opening in the frame at *h*, and is so looped on to another rod, *g*, on the spring-box F, that it moves freely without fear of displacement, and if pushed back into the spring-box is made to press upon one of the spiral springs, E, which restores it to its place as soon as it is freed from pressure. In the diagram (fig. 1) this pressure is supposed to be exerted upon three of the lifting-wires, C, C, C; consequently, if the lifting-bar A is simultaneously raised, those three wires are missed, whilst the other two, B, B, being in position, catch the projections *k*, *k*, on the bar, are drawn up with it, and thus raise the threads of the warp to which they are attached. Now, the regulation of this pressure upon the horizontal needles is effected by a revolving square drum, which has each of its four sides perforated with rows of holes, which, like the needles and lifting-wires, correspond in number to the threads of the warp. This drum, when in its place, receives into one row of perforations the whole row of needles where they project through the frame at *h*, and it has a motion given by the machinery which brings each row on its four surfaces in regular order into the same position; and if no impediment is offered all the needles are undisturbed, and the upright wires lift the entire set of warp-threads to which they are attached. But in order to produce the necessary variations of motion required by the pattern, a set of cards are made each of the width of the square face of the drum; these also are so perforated that when placed on the surface of the drum their perforations correspond exactly with those on the face immediately beneath them; but the cards are perforated in exact accordance with the pattern, so that intervals occur in which there are no perforations to correspond with those on the drum face; hence, when the drum L (fig. 8) is brought up to the frame *h*, some of the needles will find entrance into the holes of the drum through the corresponding perforations in the covering card, seen in section M, fig. 8; but others will be prevented entering by the absence of such perforations, and the card, by the resistance it offers, will force the needles thus opposed back upon the springs E, E, E, removing thereby the hooks of the lifting-wires from the action of the lifting-bar. The cards are looped together at the corners, and move as an endless chain on the drum faces, and the entire set of perforations on the whole chain of cards exactly represents the pattern to be produced; the same as the notes represent the air in a piece of music.

Into the numerous varieties of weaving and the modifications both of looms and cloth it is quite impossible here to enter. The ribbon-loom is a most distinctive structure, in which many small webs are simultaneously woven; and the apparatus in which tubular fabrics, such as seamless sacks, is woven is an ingeniously modified loom. Of the leading varieties of weaving it must suffice simply

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to mention double-cloth, in which two warps are simultaneously woven and combined into one fabric; looped textures, like Brussels carpeting, which with the loops cut become pile fabrics, as, for example, velvet; and gauze or leno, in which the contiguous warp-threads make a half-twist around each other between each throw of the shuttle.

See Darlow, *History and Principles of Weaving* (1878); Ashenhurst, *Treatise on Weaving and Designing Textile Fabrics* (1888); Beaumont, *Woollen and Worsted Cloth Manufacture* (1888); Brown, *Practical Treatise on the Power-loom* (1887); *The Textile Manufacturer*, and other technical periodicals and journals; also the articles CARPETS, COTTON, LINEN, RIBBON, SILK, SPINNING, THREAD, VELVET, WOOL, &c.

Weber, CARL MARIA FRIEDRICH ERNST VON, composer and pianist (1786–1826), came of a noble Austrian family whose musical proclivities seem to have grown with the decay of fortune. His father, Franz Anton von Weber, who began life as a soldier, excelled in violin-playing; likewise his uncle Fridolin, whose daughter Constanze became the wife of Mozart. Well advanced in a chequered career, Franz Anton married at Vienna in 1785 his second wife, Genovefa von Brenner, a singer of reputation. Returning thence to Eutin, near Lübeck, where but lately he had been Kapellmeister, he was glad to accept the humbler post of director of the town band. Carl Maria was born December 18 (?), 1786; and soon afterwards the restless father finally left Eutin with his wife and boy to wander from town to town at the head of a small dramatic company. The child was afflicted with hip-disease; but as soon as he could sit at the piano he was industriously plied with music lessons in the hope that he might rival the wonders of Mozart's early childhood. Other subjects were not neglected; and if his father's occupation conduced little to solid progress, the boy at least enjoyed endless opportunities of acquainting himself with the details of stage management. Carl Maria's serious training began in 1796 under Heuschkel of Hildburghausen, with whom he laid the foundations of his future skill at the keyboard. At Salzburg in 1798 he was taught by Michael Haydn and (now motherless) at Munich by Kalcher, to whose instructions in composition and pianoforte-playing were added singing lessons with Valesi. His very early productions young Weber for the most part destroyed; but portions of his second opera, *Das Waldmädchen*, written and produced at Freiberg before he was fourteen, he afterwards incorporated in *Silvana*, a work of greater maturity.

At Vienna in 1803 Carl Maria was warmly welcomed as a pupil by the Abbé Vogler, who obtained for him the conductorship of the opera at Breslau. This post Weber held for two years, adding to his already intimate knowledge of matters theatrical, and giving evidence of rare talent for organisation. As orchestral conductor he displayed powers truly surprising in one of his years, while he increased his mastery of the pianoforte to the highest pitch of excellence. On the other hand, Weber was oppressed by pecuniary difficulties. His salary was hardly £90 a year, his mode of life careless, and his father dependent upon him. To make matters worse, an accidental draught of poison imperilled his life and ruined his fine voice. Soon after his recovery he left Breslau at the invitation of Duke Eugene of Würtemberg for Schloss Carlsruhe, where he passed some happy months devoted to composition and the direction of the duke's band. His host subsequently had him appointed secretary to his brother, Duke Ludwig, at Stuttgart; but the position entailed many duties and pleasures sadly detrimental to his artistic development. Weber's plight soon became even worse than at Breslau, and at last his career in Stuttgart was brought to a tragic conclusion. During a rehearsal of his opera *Silvana* he was arrested on a charge of fraud. His innocence was clearly proved; banishment, nevertheless, followed on February 26, 1810. The injustice acted as a tonic, and was the means of restoring Weber to his proper domain.

The next twelve months he spent at Mannheim and Darmstadt in familiar converse with Vogler and his friends Gausbäcker and Meyerbeer, composing meantime the operetta *Abu Hassan*. Three concertos were written at Munich in 1811 for Baermann, the celebrated clarinettist, with whom he made a lengthened concert tour, the news of his father's death reaching him in Berlin. Early in 1813 he settled at Prague as Kapellmeister of the opera, charged by the manager with the entire reorganisation of the company, and well repaid by the complete success of his administration. During a visit to Gotha he composed two magnificent patriotic songs to words from Körner's *Leier und Schwert*, and eventually eight others. Later, the victory of Waterloo inspired him with the cantata *Kampf und Sieg*, performed December 22, 1815.

In 1816, having resigned his post at Prague, he was invited by the king of Saxony to undertake the direction of the German opera at Dresden. The venture was an entirely new one, Italian opera having been so far in undisputed possession. Weber began by taking the local amateurs into his confidence through the medium of the press, explaining the object he had in view and the conditions necessary to success. He had to organise an efficient chorus and (more difficult task) to engage his leading artists. The orchestra, too, needed some reform. All this was not easily done; but tact, combined with theatrical omniscience, soon won for the new director the loyal co-operation of his staff and the admiration of all save the partisans of Morlacchi, the Italian Kapellmeister. After a few months Weber's appointment was confirmed for life, and to his other duties he was called upon to add the frequent direction of the music at the Chapel Royal. On November 4, 1817, he was happily married at Prague to Carolina Brandt, the famous singer. In 1818 he wrote his Mass in E flat, the Jubel cantata and overture, and the Mass in G for the royal golden wedding in 1819. *Der Freischütz*, begun in 1817, was not complete till May 1820. The applause which greeted its production at Berlin, on June 18, 1821, was echoed in other places; in London it was played simultaneously at three theatres. Friedrich Kind, who wrote the libretto, having chosen to quarrel with Weber, he accepted for his next opera, *Euryanthe*, the literary co-operation of Frau Helmina von Chezy. The work was produced at Vienna, October 25, 1823, the first three performances, conducted by the composer, being enthusiastically received; but it did not long survive his departure. In Dresden, Leipzig, and Berlin *Euryanthe* met with the appreciation due to the grandest of Weber's dramatic creations.

But his disappointment at the comparative failure of the effort into which he had put his whole strength occasioned a long period of depression, from which he roused himself only to write his final masterpiece, *Oberon*, undertaken at the request of Charles Kemble for Covent Garden Theatre. The subject was chosen by Weber himself, and the English libretto written by J. R. Planché. Kemble's offer of £1000 doubtless weighed with the composer, now nearing his end and anxious for the future of his wife and family. But it was far from being his only consideration. So determined was he to do his best that, ill as he was, he took more than 150 lessons in English.

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March 1826 saw Weber in London, the guest of Sir George Smart, and busy with rehearsals at Covent Garden. The first performance of *Oberon* on April 12 was the crowning triumph of his life. During the next few weeks he conducted frequently at the theatre and played at many concerts. Such labour proved too much for his exhausted frame. He died during the night of June 4, and was buried at St Mary's, Moorfields, whence in 1844 his remains were removed to Dresden.

Weber has a special claim to fame as founder of German romantic opera. In this he was the direct forerunner of Richard Wagner, whose principles he anticipated not only by giving due prominence to other than purely musical considerations, but by writing music thoroughly in harmony with the character of the incidents represented. More or less tentatively exemplified in *Der Freischütz*, the conditions are fully carried out in *Euryanthe*, where dramatic recitative and declamation take the place of the spoken dialogue of its predecessor. But in other branches of composition he holds a high place, and has influenced every one of his successors.

Besides the works already mentioned he composed some earlier operas, the music to *Preciosa*, the overture *Beherrscher der Geister*, two symphonies, three concertos (including the Concertstück in F minor), several sonatas, &c. for the pianoforte, as well as a goodly number of scenas, dramatic pieces, cantatas, and songs, for a summary of which the reader is referred to Dr. Spitta's excellent article in Grove's *Dictionary of Music*. Weber's pupil, Sir Julius Benedict, has left an interesting sketch of his master in the 'Great Musicians' series, edited by Francis Hueffer. See also German works by Jähns (Berl. 1871, and Leip. 1873) and Reissmann (Berl. 1882).

Weber, Ernst Heinrich, physiologist (1795–1878), was from 1818 till his death a professor of Anatomy and of Physiology at Leipzig. He was specially distinguished for his researches on the senses. For the law named after him, see Psychology, Vol. VIII. p. 473.—Wilhelm Eduard Weber, physicist (1804–91), was the brother of the preceding, and in 1831 became professor of Physics at Göttingen. He was one of the seven professors deposed in 1837 for their protest against the revocation by the king of the liberal constitution. Associated with Gauss in his researches, he was specially distinguished for his contributions to electricity and magnetism. See the monograph by Riecke (1892).—Georg Weber, historian (1808–88), was from 1848 to 1872 director of the Bürgerschule in Heidelberg, and wrote a long series of historical works. Among them are books on Calvinism in Germany, on the Reformation in England, on the period of the Reformation, a history of Israel, the origin of Christianity, and a history of literature. But he is best known by his *Manual of Universal History* (20th ed. 2 vols. 1888) and his larger *Universal History* (15 vols. 1857–80; 2d ed. 1882–90).

Webster, a manufacturing town of Massachusetts, on French River, 16 miles by rail S. of Worcester. Pop. 7030.

Webster, Daniel, American statesman and orator, was born at Salisbury, New Hampshire, 18th January 1782. His father, a sturdy farmer of the border, was a member of the state legislature and a county judge. As a child Daniel was delicate, and therefore exempt from the labours of the farm. He entered Dartmouth College in 1797, poorly prepared, but soon impressed his teachers with his remarkable power of acquiring what interested him and his fluent eloquence. He graduated in 1801, studied law at Salisbury and Boston, was admitted to the bar in 1805, and quickly rose into notice at Portsmouth, the chief town of his state. Political discussion also enlisted his energies, and with the New England Federalists he opposed the second war with Great Britain. Sent to congress in 1813, he served two terms, maintaining an honourable position in an unpopular party. In 1816 he removed to Boston, where he soon became prominent as an advocate. Having been admitted to the bar of the United States Supreme Court, he established his forensic fame by the Dartmouth College case, which formed an era in the interpretation of constitutional law. The New Hampshire Supreme Court had sustained the legislature in an attempt to remodel the college; but in 1818 Webster, by a great speech, moved Chief Justice Marshall to reverse that decision, and it was declared that the original royal charter of Dartmouth, in spite of the change of sovereignty consequent upon American independence, was still a contract which could not be impaired without violating the national constitution. In the field of popular eloquence Webster's fame was first made national by his oration on the 200th anniversary of the landing of the Pilgrims—an effort which was surpassed by his address at the laying of the corner-stone of the Bunker Hill monument, 17th June 1825, and equalled by his eulogy on Adams and Jefferson in August 1826.

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Returning to congress in December 1823 as a representative from Massachusetts, Webster found few rivals. Henry Clay, then Speaker of the House, made him chairman of the judiciary committee. His speech on the Greek revolution, delivered in January 1824, and translated into most European languages, extended his fame still more widely. It was the first expression of his conception of the grand destiny of the United States. After rendering important services in the House of Representatives, Webster was in June 1827 transferred to the senate, the scene of his greatest triumphs. In the early part of his congressional career he had favoured free trade and opposed the policy of protection. But in 1828 he gave his adhesion to Clay's 'American system,' and vigorously defended the new protective tariff. His reason for the change was that the people of New England, adapting themselves to the policy imposed on them by the previous action of the Federal government, had established manufactures, and that it was now the duty of the government to respect and uphold vested interests. Webster's whole career was marked by a deep reverence for established institutions and accomplished facts. The principle of nationality, the dominant passion of his mind, was fully manifested in his prompt and thrilling reply to Senator R. Y. Hayne of South Carolina, who had in January 1830 attacked New England as opposing the growth of the Union. After repelling personal assaults and the slanders on his native section, he exposed the fallacy of nullification, and portrayed with matchless skill an ideal of the Union, which deeply impressed the hearts of the people, and became thenceforth a potent factor in the national life.

Benton describes Webster as then 'the colossal figure on the political stage;' he was courted by President Jackson, whom he was destined soon to oppose stoutly; he was rivalled only by Clay and Calhoun, above whom he towered in intellect, but before whom he was deficient in will-power; and in the crisis 'will more than intellect was to rule.' After wearisome years of opposition the Whig party triumphed in 1840, and Webster was called into President Harrison's cabinet as Secretary of State. Harrison died a month later, and his successor, Tyler (q.v.), changed the policy of the administration. Four of the secretaries resigned, and Webster was criticised and denounced by his

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own party for remaining. His persistence was justified by the successful negotiation of the Ashburton treaty with Great Britain. When this protracted business was finally settled he resigned in May 1843. In 1844 Webster refused his party's nomination for president and supported Clay, who was, however, defeated by Polk. In 1845 Webster returned to the senate. He assisted in averting a threatened war with England over the north-western boundary, which was fixed on the parallel of 49° suggested by him. His speech in defence of the Ashburton treaty in 1846 contained also answers to personal attacks on himself as being in the pay of New England manufacturers. The truth is that, being careless in money matters and lavish in expenses, he had accepted assistance from political friends, but he was entirely free from corruption or defalcation. The leading event of Polk's administration was the war with Mexico, which Webster opposed, as he did also any acquisition of territory by conquest. The war gave the Whig party its next candidate for the presidency, General Taylor. Webster bitterly declared the nomination 'one not fit to be made,' and refused the second place on the ticket. Yet he advised his friends to vote for Taylor, who was elected.

The question of slavery, which had long been agitated, now became the all-absorbing problem. Webster had held the prevalent Northern view that slavery was, under the constitution, a matter of domestic policy, left with the states, not to be interfered with by the general government. He deprecated the annexation of Texas and the extension of slavery, but he rebuked the formation of the Free Soil party, and in 1850, after expressing his approval of Clay's compromise, he wrote that he abhorred slavery, but was unwilling to break up the Union to abolish it. His final position was declared in his speech of the 7th March 1850, in which, after a dispassionate review of the history of slavery, he detailed the grievances of both North and South, giving emphasis and sympathy to the latter. His Northern friends were dismayed, while the Abolitionists were enraged. Whittier gave voice to a deep popular feeling in his *Ichabod*. Webster had come to regard slavery as one of the vested interests of the American nation. He had now lost his controlling influence in Massachusetts; but he was still a factor in national politics. After President Taylor's death in July 1850 Fillmore called him to his former post as Secretary of State, where again there were differences with England to settle—a protectorate in Honduras and disputes about the fisheries. Webster was deeply disappointed at not receiving the Whig nomination for the presidency in 1852. His health and spirits gave way, and he was obliged to retire from Washington to his home at Marshfield, Massachusetts, where he died on 24th October 1852.

Webster was the greatest of American orators. He was of large frame, and his brain greatly exceeded the average weight. His dark face, otherwise heavy, was lighted by large expressive eyes. His voice was of matchless compass, his utterance deliberate. Good taste, good sense, and an unrivalled gift of arrangement and style supported his glowing eloquence. The imposing dignity of his manner often rose to majesty, and he was called by his admirers 'the godlike Daniel.' As a secretary of state he was admirably qualified; his mighty memory and his power of working hard when he chose fitted him to deal with complicated international questions as they arose. But his statesmanship was throughout marked and limited by his reluctance to interfere with established institutions. His lasting service to his country was as the apostle of nationality. It must be admitted that his moral character deteriorated under adulation and the disappointment of his most cherished ambition. Had his conscience matched his intellect he would have taken a nobler position on the question of slavery, and might have attained the first rank among American statesmen. Dreading innovation, he was content to be known as 'the great expounder of the constitution.'

Webster's *Speeches, Forensic Arguments, and Diplomatic Papers* were published in six volumes (1851); his *Private Correspondence* in two volumes (1857). The best biographies are by G. T. Curtis (2 vols. 1869) and by Henry Cabot Lodge (1884).

Webster, JOHN, one of the great names of English Tragedy, was alive and writing for the stage between the years 1602 and 1624. But beyond this all is conjecture; when and where he was born and died it is impossible to ascertain. Webster is described on the title-page of one of his works as a merchant-taylor; and he was long supposed, on no sufficient authority, to have been at one time clerk of St Andrews, Holborn. For his name is not on the register of that parish, nor has research elicited any sound collateral evidence on the point. That he must be confounded neither with John Webster, the author of *The Saint's Guide*, nor with John Webster of Clitheroe, the careful investigation of the Rev. Alexander Dyce, the dramatist's first editor, has made certain. Here, then, the materials of the biographer end. Himself has said, 'I rest silent in my own work.' Webster's first recorded writing was a share in *Lady Jane* and *The Two Harpies*, a pair of patch-work productions, in which Dekker, Drayton, Chettle, and others were his collaborators; both are lost. In 1604 he made some additions to the *Malcontent* of Marston. How far these went we have no means of knowing, but we may conjecturally ascribe to him the 'Induction,' a sprightly prelude to what Marston well calls his *aspera Thalia*. In 1607 were printed *The History of Sir John Wyatt*, a tragedy, and two comedies, entitled *Westward Ho* and *Northward Ho*, all three the joint work of Webster and Dekker. The *History* is merely remarkable for a text singularly corrupt, but the twin-companions are a notable contrast. Both are vigorous, breezy, humorous plays, interesting as documents on the manners of their day. But while *Westward Ho* is an ill-constructed combination of prose and poetry (the best of it clearly Dekker's), *Northward Ho* is symmetrical, strong in construction, and written throughout in a sturdy, homespun prose, without hint of poetry from beginning to end. Five years later came the *White Devil*, and with its publication Webster entered his kingdom, rising near the level of the greatest tragic writers of any time. Pathos, passion, truth to nature, combined with astounding art of execution, are qualities seldom if ever more consummately displayed than here. *The Duchess of Malfi*, published in 1623, is a yet more supreme achievement in tragic art. All the great qualities of the *White Devil* are revealed with a still greater perfection of poetic beauty and verbal fitness. The story too is infinitely sympathetic. Pity and terror, the tragic emotions, are wrought to their uttermost of endurance. Published in 1654, *Appius and Claudius* has poetry, pathos, simplicity, and constructive excellence in the plot. But set beside these others it seems cold, pale, and merely pretty, lacking, in brief, the signal qualities of Webster's best work. *The Devil's Law Case* (1623), excepting only the excellent passages quoted in Charles Lamb's *Specimens*, is disagreeable and sordid. An ode on the death of Prince Henry, with other fragments of verse (all inferior to the noble prose of his prefaces), makes up the sum of Webster's writings. In 1664 Kirkman the printer, an

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ignorant man and an unscrupulous, published two comedies, *The Thracian Wonder* and *A Cure for a Cuckold*, which he declared to have been written by Webster and Rowley. Kirkman's unsupported word proves nothing, and although some ingenuity has been exercised to prove Webster's paternity in the case of the former play, both actions may be unhesitatingly dismissed. In 1624 a tragedy entitled 'the recent murther of the sonn upon his mother, written by Forde and Webster,' was licensed for the stage. It is lost to us now, with how much more!

Not popular in his own day, Webster, in Mr Swinburne's happy phrase, 'found his first recognition at the pious and fortunate hands of Charles Lamb.' Since then he has been praised to reverence by various masters of criticism, and his name claimed by enthusiastic writers as the next in tragic art to Shakespeare's. An attempt at a detailed appreciation may be spared in the case of a dramatist whom Lamb and Hazlitt have praised in imperishable sentences. But a single word may be said of Webster's limitations as these are defined in Kingsley's *Plays and Puritans*, and elsewhere. Webster is charged with the faults of Tourneur—with having a diseased view of human nature, and the art of a poet of horror and the shambles. In support of the last part of the indictment the many terrible episodes of the *White Devil* and *The Duchess* are cited. But no poet should be judged by episodes and scenes removed from their context and considered in 'a cold abstraction.' The effect produced *on the reader as he reads* is the only just test, and to examine this is the true function of the critic as the other is that of the *advocatus diaboli*. To him who reads no episode in either of Webster's masterpieces seems forced and wrong; the atmosphere is charged with horror, and each point of terror is a just and natural step towards the catastrophe. For the rest it will suffice to say that no one ever rose from Webster's pages inspired with any but a more spacious, a loftier, and a braver view of life and its issues. There are instances without end in his best work where nature seemed to take the pen and write for him. But passion and pity and terror were the emotions that transcribed their secrets for him; not cynicism and nausea. The chosen epithet of Hazlitt in this connection, echoed by Mr Swinburne, is the last word on this dramatist: 'there is no nobler-minded poet than Webster.'

See C. Lamb's *Specimens of English Dramatic Poets*, &c., and Hazlitt's *Lectures on the Literature of Elizabeth*, &c. Webster's works were first collected by the Rev. Alexander Dyce (4 vols. 1830), next by Hazlitt (1857–58). See also the edition by Mr J. A. Symonds in the 'Mermaid' series, and Mr Swinburne's admirable essay in *The Nineteenth Century*, June 1886.

Webster, NOAH, lexicographer, was born in Hartford, Connecticut, 16th October 1758. His studies at Yale College were interrupted by service in his father's company of militia in the war of independence, but he graduated in 1778, and thereafter took to teaching and to the study of law, being admitted to the bar in 1781. But he soon returned to teaching, and made so great a hit with the spelling-book which formed part of *A Grammatical Institute of the English Language* (3 parts, 1783–85) that for twenty years he and his family lived on its meagre royalty of less than one cent a copy. Political articles and pamphlets, lecturing, journalism at New York, a few years' prosperous practice of law at Hartford, and again journalism in a fresh venture at New York occupied his life till 1798, when he retired to a life of literary labour at New Haven. Here, with the exception of the years 1812–22 spent at Amherst, Massachusetts, he lived till his death, 28th May 1843. Long a devoted student of the English tongue, he published *A Philosophical and Practical English Grammar* (1807), and the famous *American Dictionary of the English Language* (2 vols. 4to, 1828), the fruit of the labours of twenty years.

A second edition followed in two volumes (1840–41), with a supplement in 1843. The chief later editions were those by Professor Chauncey A. Goodrich, his son-in-law (1847), that of 1864 (edited after Goodrich's death in 1860 by Noah Porter), in which the etymologies were by Dr C. A. F. Mahn of Berlin (supplement in 1879 by Professor F. B. Dexter), and the revision of 1890 executed under the supervision of Professor Noah Porter. See the Life by Horace E. Scudder in the 'Men of Letters' series (Boston, 1882).

Wedderburn, ALEXANDER, a Lord Chancellor of England, ennobled as Lord Loughborough and Earl of Rosslyn, was born at Edinburgh, 13th February 1733, the son of a Scottish judge. He passed as advocate, but was called to the English bar in 1757. He entered parliament in 1762, took part in the great Douglas cause, and in 1771 left the opposition to become a strenuous supporter of Lord North as Solicitor-general. He supported the American war policy, and was made chief-justice as Lord Loughborough (1780); but in 1784, disappointed of the chancellorship, passed over to Fox, and curried favour with the Prince of Wales. Insinuating and unscrupulous, he next made friends with Pitt, by whom he was made Lord Chancellor (1793), but to whom he played false. Addington gave him his earldom (1801), and he died 2d January 1805.

Wedding Ceremonies doubtless arose by degrees and in different ways; and often when the mode of contracting a marriage altered, the earlier mode survived as a ceremony. Thus, for example, the system of capture was transformed into a mere symbol after purchase was introduced as the legal form of contracting a marriage, and again the custom of purchase has survived as a ceremony after it has ceased to be a reality. Marriage being a matter of some importance naturally begot ceremonial—symbolical of sexual intercourse, or of living together, or of the wife's subjection to the husband. And naturally religious rites would be added to give sanction—prayers, sacrifices to appease the gods. There was no religious contract among the ancient Hebrews, and there is no trace of priestly consecration in the Scriptures or the Talmud. Under Christianity a religious character came early to be given to the rite, although the early church, like the Buddhists, regarded marriage as little more than a concession to human weakness. The notion that marriage is a sacrament grew naturally out of St Paul's phrase, 'This is a great mystery' (Eph. v. 32), for the Vulgate translation renders μυστήριον by 'sacramentum.'

One of the most wide-spread rites of marriage is that of the man and woman eating out of the one dish, as we see it, for example, all over the Malay Peninsula, and elsewhere. Among the Roman three forms of marriage prayers, sacrifices, and auspices were essential only in the *confarreatio*, not in the *coemptio* and *usus*. In the first of these, the old patrician mode, the chief ceremony was the offering of a cake of spelt, made to Jupiter in the presence of the *pontifex* and *flamen Dialis* with ten witnesses. The *coemptio* again was a symbolic sale in which the father delivered his daughter to her husband as a piece of property, she at the same time declaring her consent. In the betrothal the bridegroom gave the bride earnest-money, as in other cases of contract, or a ring in its stead. The *usus* resembled our *handfasting*, the only thing required being that the woman should live a year in the man's house without absenting herself from his bed for three nights.

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Our modern 'best-man' is no doubt the survival of the bridegroom's best helper in the act of capture. In the good old times there were many hearty wedding customs now considered almost as indecorous as Squire Western's jokes would be, such as the struggle for the bride's garters, the drinking of healths in the bridal chamber, the singing of boisterous and appropriate songs outside the door, and the like. The throwing of rice is not an indigenous English custom, and has displaced the strewing of herbs, flowers, and rushes on the way to church. The giving of garlands, gloves, and the like has fallen into disuse; but knots and favours are still used symbolic of indissolubility; and the ring and bridescake retain their place, oldest and most universal of our wedding customs. The wedding-feast was sometimes protracted for a week, and it was formerly the universal custom amongst the poor for the guests to bring contributions of all kinds in what were called *penny-weddings*, so that the young couple not only saved the expense of the feast, but had something over on which to begin housekeeping. The modern custom of giving presents is a survival of a time when such were more immediately useful than they now often are. Many minor customs are observed in different corners of the kingdom, governing the whole order of procedure, and these it is necessary to respect in order to ensure success in the enterprise. Thus in Shropshire the bride must be dressed entirely in new clothes, of any colour but green, without even a pin that she had ever used before; although elsewhere it is lucky to wear something already worn by a happy bride. Often the bride's father does not go to church; the mother never does. Great pains used to be taken to select a favourable day—the importance of this we see in the dislike to May (q.v.), or again in the Bedouin preference for Friday, the Chinese for spring or the last month in the year. In olden times the actual sale of wives was not unknown in England, and we are told that the second Duke of Chandos bought his second wife in 1744 from her husband, an ostler in Newbury, who was offering her for sale as the duke passed through the town. See FAMILY, MARRIAGE, HANDFASTING, BRIDE, RING, JUS PRIMÆ NOCTIS.

Wedge, one of the mechanical powers, in principle a modification of the Inclined Plane (q.v.). The power is applied to the back of the wedge by pressure or, more usually, by percussion. Familiar examples of its use are the splitting of wood, the fastening firmly of the handle of an axe, the raising of a ship in a dry-dock, &c. Axes, nails, plugs, planes, chisels, needles, and all sharp-pointed instruments are examples of the single wedge.

Wedgwood, JOSIAH, the creator of British pottery as an art, was born at Burslem, Staffordshire, 12th July 1730. His father was a potter, and at ten he was set to work at the same business, his education being of the scantiest. After an abortive attempt to settle himself at Stoke with a partner named Harrison, in 1759 he returned to his native place, and there commenced business as a potter. From the first his ardour for the improvement of the manufacture was conspicuous. His earliest efforts were directed to the refining of the material, and in 1763 he took out a patent for a beautiful cream-coloured porcelain, which became popularly known as Queen's Ware, Queen Charlotte having much admired it, and extended her patronage to the manufacturer. Subsequently, other improved materials were produced. The attention of Wedgwood was not less assiduously directed to considerations of form and decoration; he busied himself in emulating the grace of the antique models; and the celebrated sculptor Flaxman was from 1775 employed to furnish designs for his 'Wedgwood ware'—white cameo reliefs on a blue ground and the like. In this way what he found a rude and barbarous manufacture he raised to the level of a fine art; and he found his reward in the amassing of a fortune of upwards of half a million. In 1769 he had removed his works some little way from Burslem; and to the new site he gave the fanciful name Etruria, as that of the country of old most celebrated for the beauty of its ceramic products. Here he built himself a splendid mansion; and here he died, 23d January 1793.

Apart from his eminence in the art to which he mainly devoted himself, Wedgwood was a man of considerable culture. Natural philosophy, in particular, he studied with much success. He was a fellow of the Royal Society, as also of the Society of Antiquaries; and to the *Philosophical Transactions* he from time to time contributed papers. He likewise interested himself deeply in all matters of public concernment; and mainly through his influence it was that the Grand Trunk Canal, uniting the waters of the Mersey, the Trent, and the Severn, was carried out. He was a man of much benevolence of character, and the prosperity which flowed upon him through life was distinguished by the exercise of an almost princely liberality.

See Llewellen Jewitt, *The Wedgwoods* (1865); the Life by Eliza Meteyard (2 vols. 1866); three other works by her (1872–73); and Mr Gladstone's *Gleanings* (1879); also the article POTTERY, p. 367, and PORTLAND VASE.

Wedmore, a village and parish (pop. 3060) of Somersetshire, 8 miles WNW. of Wells. Here the peace of Wedmore was signed in 878 between King Alfred (q.v.) and Guthrum the Dane. See Prof. Earle's *Peace of Wedmore* (Oxford, 1878).

Wednesbury (locally *Wedgebury*), a municipal and parliamentary borough in the south of Staffordshire, 8 miles NW. of Birmingham. Crowning a hill at the north end of the town is the cruciform Perpendicular church of St Bartholomew, supposed to occupy the site of a temple of Woden—whence the Anglo-Saxon name, *Wodnesbeorh*. It seems to have been built in the 11th, and rebuilt in the 15th century, and was much altered and restored between 1766 and 1885. Here, too, in 916 the Princess Ethelfleda, Edward the Elder's sister, founded a castle. Modern buildings are the town-hall (1872), public baths, and free library (1878), and art gallery and museum (1891), with a collection of modern paintings, the gift of a local benefactor, valued at £10,000. One of the great iron towns of the Black Country, in a district abounding in coalpits, ironworks, railways, and canals, Wednesbury has manufactures of boiler-plates, bar-iron, steel, railway ironwork, gas and steam tubes, edge tools, &c. In 1886 it was incorporated as a municipal borough, and in 1867 was made a parliamentary borough, returning one member, and till 1885 including West Bromwich (q.v.). Pop. (1851) 11,914; (1881) 24,566; (1891) 25,342; of parliamentary borough (1891) 69,083. See the *History of Wednesbury* (Wolv. 1854).

Wednesday, the fourth day of the week, the *Dies Mercurii* of the Romans, the *Mittwoch* ('mid-week') of the modern Germans. The Anglo-Saxon form was *Wódnes dæg;* the Dutch, *Woensdag;* Swedish and Danish, *Onsdag*.

Weed, a popular name for any sudden illness, cold, or relapse with febrile symptoms in women after confinement or nursing, especially Milk-fever (q.v.) and inflammation of the Breasts (q.v.).—In horses Weed, or Shot of Grease (Lymphangitis), consists in inflammation of the large absorbent glands and vessels situated between the horse's thighs, occurring particularly after a day or two of rest, after exposure to cold, or during imperfect action of the bowels. See VACCINATION.

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Weed, THURLOW, journalist, was born at Cairo, New York, November 15, 1797, was employed as a lad in several printing-offices, served as a private in the war of 1812, and afterwards edited newspapers in Western New York, until in 1830 he founded the Albany *Evening Journal*, an anti-Jackson, Whig, or Republican paper, which became the organ of the party, and which he controlled for thirty-five years. He was a leading party manager, and exercised almost supreme influence in nominations and appointments, while declining all offices for himself. In 1867–68 he was editor of the New York *Commercial Advertiser*. He died 22d November 1882. See his *Autobiography* (1882; vol. ii., by his grandson, 1884).

Weeds, the name given to all those plants which grow wild in cultivated grounds, and injure the crops; which they do both by choking them and by exhausting the soil. Those weeds which are annuals or biennials, as charlock, yellow rattle, and melilot, may gradually be got rid of by merely cultivating, for a succession of years, such plants as are to be cut before the seeds of the weeds are fully ripe. Perennial weeds, such as couch-grass, can only be removed from the ground by repeated and careful tilling; and for this purpose crops which require much hoeing are advantageously planted, and recourse is had to summer fallowing (see FALLOW) in fields, and frequent weeding in gardens. Thistles and other large weeds are frequently pulled in cornfields before the corn comes into ear, and to prevent their seeding they are cut in pastures. Sedges and rushes, which spring up in great abundance in damp grounds, disappear on thorough draining. Leafy crops which thickly cover the soil prevent the growth of many weeds by the exclusion of air and light. Weeds which have been rooted up form excellent compost for manure. Those which make their appearance in fallow grounds serve for green manuring when they are ploughed down. Cultivated grasses growing in arable fields are weeds there. The seeds of weeds are carried normally by the wind, but may be conveyed by running streams. Weeds are often sown along with crops, the seed being imperfectly cleaned; and they are often spread by manure, conveyed by the droppings of birds, or in the mud clinging to the feet of men and animals. Weeds spread far and near from ill-cleaned hedgerows. Weeds transferred to new countries sometimes grow more luxuriantly than at home; thus the Anacharis (q.v.) from America almost chokes up ditches and canals in England, and the thistle from Britain is a ruinous pest in some parts of Australia.

Week designates generally a period of seven days. It was probably first instituted as a kind of broad subdivision of the periodical month, corresponding to the four quarters of the moon, or about 7⅜ days. Neither this civil division of time nor its application to sacred things was originally solely Jewish, but we find the earliest Jewish cosmogony and legislation closely connected with it. The older of the two accounts of the creation (Gen. ii. 4 *et seq.*) does not recognise the six days' work, and indeed we may assume the connection between the seven days' week and the work of creation as an accommodating generalisation of later days with the symbolic number *Seven* (q.v.). The Sabbath is emphatically the day of rest, while seven weeks after the Passover the Pentecost or Feast of Weeks takes place. The Egyptians at an early period counted seven periodical days, naming them according to the seven planets. The application of the names of the planets to the days of the week in the order they now stand originated in this way: it was an astrological notion that each planet in order presided over an hour of the day, the order, according to their distances from the earth, being, on the geocentric system, Saturn, Jupiter, Mars, the Sun, Venus, Mercury, the Moon. Assuming Saturn to preside over the first hour of Saturday, and assigning to each succeeding hour a planet in order, the 22d hour will fall again to Saturn, the 23d to Jupiter, the 24th to Mars, and the first hour of the next day to the Sun; in the same way the first hour of the following day falls to the Moon, and so on. From Alexandria this seven days' week was imported, together with the names of the individual days, to the Greeks—who previously divided their months into three decades—and to the Romans about the time of Christ. Rome had previously counted her periods by eight days, the eighth day itself being originally called *Nundinæ* —a term later applied to the whole cycle—as returning *nono quoque die*, when the country-people were in the habit of coming to town for the purposes of business, and chiefly to inquire after public news, the changes in government and legislation, vacant places, and the like. But the seven days' cycle soon found great favour among the Romans, owing partly perhaps to the spread of Egyptian astrology, although the change was not officially introduced before Constantine. It is certain that the Jewish name Sabbath came into use in Rome, and from Rome it spread to all the Romance languages, and even into the Teutonic. In the same manner the Latin *Septimana* (the Greek *hebdomas*) has become the modern designation for week in the Italian *Settimana*, Spanish *Semana*, and French *Semaine*. The *Codex Theodosianus* is the first document which adopts the term *Septimana* in the meaning of 'week.' The Jews, as well as the early Christians, had no special names for the single days, but counted their number from the previous Sabbath, beginning with Sunday, as the first after the Sabbath, and ending with Friday, as the sixth after the previous or eve (*Ereb*) of the next Sabbath. After a very short time, however, young Christianity, which in the same manner had endeavoured to count from the *feria secunda*, or second day after Sunday, to the *Septima* (or Saturday), had to fall back again upon the old heathen names, previously introduced in Gaul, Germany, &c. by the heathen Romans. The Sunday, or *dies Solis*, alone was changed in many of the Romanic languages in accordance with the new creed. It was called *Kyriake*, *dies Dominicus* or *Dominica*, the 'Day of the Lord,' a term which in Italian became *Domenica*, in Spanish *Domingo*, and *Dimanche* in French. It is very curious to notice how the names of the five days of the week which followed those named after the sun and moon became Germanised, as it were, or the names of the originally imported gods translated into those of the Germanic divinities. Quakers disapprove of the heathen names, and name the days 'First Day,' 'Second Day,' &c. The Arabs, like the Jews, count their days, beginning and ending with sunset, by sevens, without giving them planetary names. Greeks, Slavs, and Finns also count their days from Sunday, instead of naming them. The French Revolution altered the seven days' week into a decade of ten days; but the new computation introduced in 1793 was abrogated again in 1805. The 'weeks of years,' in Hebrew prophetical poetry (like the Roman *annorum hebdomadæ*), indicate cycles of seven years.

See CALENDAR, SABBATH: and Ideler's *Chronologie* (1831); Grimm's *Deutsche Mythologie* (1835); and Lenormant's *La Magie chez les Chaldéens* (1874); and for the Feast of Weeks, see FESTIVALS.

Weems. See EARTH-HOUSES.

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Weever, or STING-FISH, a genus of fishes (Trachinus), of which two species, the greater (*T. draco*), 12 or 13 inches long, and the smaller (*T. vipera*), are both British, and are esteemed for the table. They have sharp dorsal and opercular spines, with which they can inflict serious wounds.

Weever, JOHN (1576–1632), author of *Ancient Funerall Monuments* (1631; 3d ed. by Tooke, 1767), was a native of Lancashire, studied at Queen's College, Cambridge, and died in London.

Weevil, a popular name for a large number of beetles, marked by the prolongation of the anterior part of the head into a beak or proboscis, generally used by the females as an ovipositor, and by both sexes as a boring organ. They were formerly ranked in one family Curculionidæ, but Le Conte constituted them a special group with the title Rhynchophora, and divided them into several families—Curculionidæ, Scolytidæ, Brenthidæ, and Anthribidæ. According to some authorities there are about 30,000 species; and most would allow at least half that number. With few exceptions the footless grubs are destructive to plants. The Curculionidæ are compact weevils, with very hard wing-covers, and with a downward-pointing beak or proboscis, bearing the antennæ on its sides and the mouth-parts at its end. Their scales are often very brilliant. With few exceptions they devour plants—roots, stems, leaves, fruits, seeds, or, in fact, any part. Among the 10,000 described species are: *Calandra granaria*, whose larvæ feed on stored grain; *C. oryzæ*, attacking rice, wheat, and maize; various species of Rhynchophorus, whose large, fleshy, white larvæ, known as palm-grubs or *grugru*, are sometimes eaten; Balaninus, whose mandibles, unlike those of other beetles, move vertically, whose larvæ are hatched in chestnuts, hazel-nuts, acorns, and the like; *Trichobaris trinotata*, a little black weevil, which destroys potatoes in America; *Anthonomus pomorum*, often destroying apple-blossom in Britain; *Conotrachelus nenuphar*, which lays its eggs in nectarine, plum, apricot, peach, and other stone-fruit, and is a great pest in America; *Cionus scrophulariæ*, whose larvæ spin cocoons remarkably similar to the capsules of *Scrophularia nodosa*, which the insect usually infests; Pissodes, whose larvæ attack pines; *Phytonomus punctatus*, a clover weevil, introduced from Europe into America; *Entimus imperialis*, the diamond-beetle, with very brilliant scales. Species of the likewise brilliant Rhynchites attack fruit-trees; species of Apion especially affect vetches; and those of Larinus infest Compositæ.

The Scolytidæ are very small weevils, some almost microscopic, which, both as larvæ and as adults, bore in wood and bark of trees, especially Coniferæ, and occasionally attack herbaceous plants (see BARK BEETLES). The Brenthidæ are much elongated weevils, mostly tropical, usually infesting bark, and notable for the combats of the rival males, which are larger and better armed than their mates. Brenthus and Eupsalis are representative genera. Among the Anthribidæ *Cratoparis lunatus*, common in the eastern United States, feeds on the fungi of dead trees; and the larvæ of Brachytarsus are even more aberrant in their habit, for they are parasitic on female coccus-insects. The seed-inhabiting 'weevils' or Bruchidæ, which do much damage to the seeds of leguminous plants, within which the larvæ hatch and pupate, were excluded by Le Conte from his group Rhynchophora, and placed near the Chrysomelidæ. Both in Europe and America *Bruchus pisi*, *B. rufimanus*, &c. are destructive to peas and beans, but the common pea-weevil in England is *Sitones lineatus*, one of the Curculionidæ.

The most important British weevils are probably the following: *Anthonomus pomorum* on apple-blossom; *Apion apricans*, &c. on clover; *Bruchus rufimanus* on bean-seed; *Hylesinus fraxini*; *Hylurgus piniperda*; species of Otiorhynchus on vines, raspberries, strawberries, &c.; *Scolytus destructor*; *Sitones lineatus*. For preventing or lessening the attacks of these pests, see Miss Ormerod's *Manual of Injurious Insects* (2d ed. 1890).

See *Riverside* or *Standard Natural History*; Le Conte and Horn in *Proc. Amer. Phil. Soc.* (xv. 1876).

Wegscheider, JULIUS AUGUST LUDWIG, rationalistic theologian (1771—1849), became professor of Theology at Rinteln in Hesse, and in 1810, at Halle. His chief work was the *Institutiones theologicæ dogmaticæ* (1815).

Weighing-machines, contrivances for ascertaining the weight of any object, the name being, however, specially appropriated to those used for large and heavy objects, as large bales, casks, laden carts or vehicles, cattle, &c.; while those employed for finer purposes are called balances. The large and cumbrous ones are usually modifications of the principle of the steel-yard. See BALANCE.

Weights and Measures. Of the earliest standards of length the principal were the palm or handbreadth, the foot, and the cubit (from elbow to tip of mid-finger). There were two leading cubits: the natural cubit in Egypt, Chaldea, Phœnicia, and Greece = 6 palms = 2 spans = $1\frac{1}{2}$ foot = 18·24 inches; and the royal cubit of Memphis, found also in Babylonia and Chaldea = 20·67 inches. The Greek foot (= 12·16 inches) passed into Italy and was there divided into 12 unciæ (inches); it was afterwards shortened, becoming as small as 11·65 inches. The Romans used a 3-foot *ulna*. The Saxons used an ell or yard of 36 inches, based on the Roman foot. This was continued by the Normans in England, various modifications occurring in the ell. Henry VII. and Elizabeth made standard yards of 36 inches: Henry's was 35·963 inches of the present standard; Elizabeth's was about $\frac{1}{10}$ inch short of the present yard. In 1742 the Royal Society of London made a standard 42-inch scale; in 1760 Mr Bird made for a Weights and Measures Committee of the House of Commons a copy of an old yard-measure found in the Tower. In 1824 (5 Geo. IV. chap. 74) this copy was legalised as the standard yard, with the direction that in the event of its being lost, the standard was to be recovered by making the length of a mean-time seconds pendulum in the latitude of London, in a vacuum at sea-level equal to 39·1393 inches. In 1834 the standard was destroyed in the fire at the Houses of Parliament. In 1838 a committee was appointed under Mr Airy, astronomer-royal; in 1841 they reported against the accuracy of the pendulum-method; in 1843 they were appointed as a commission to restore the lost standards; this they did between 1843 and 1854 by taking the best secondary evidence, and they produced a standard bar of gun-metal, the distance between two lines on which, crossing two gold studs, is one yard at 62° F. and 30 inch bar. pressure. This was legalised as the standard by 18 and 19 Vict. chap. 72. Parliamentary copies are lodged at the Mint, the Royal Observatory, Greenwich, with the Royal Society of London, and immured in the parliament buildings, Westminster; while copies have been supplied to many towns. The Weights and Measures Act of 1878 (41 and 42 Vict. chap. 49) regulates the law, renders all old local or customary weights and measures, other than imperial ones, illegal, and enacts penalties on false and unverified weights and measures varying from £5 to £50.

Two-thirds of a cubit, we have seen, made a

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'foot;' a cubic 'foot' of water weighed a talent. When the 'foot' was ⅔ the royal cubit, the talent was 655,566 grains; this was the Egyptian, Hebrew, and Olympic monetary talent, later known as the great Alexandrian talent of brass and the Egypto-Roman talent. A talent half this weight was known as the Alexandrian talent of silver, or 327,783 grains; this was divided into 60 minas of 5463 grains each; these are the origin of the Saxon moneyer's lb. of 5400 grains = Mint lb. or Tower lb. = old apothecaries lb. of Germany; one such lb., in silver coins, was the original form of 'one £ sterling,' and was divided into 20 'shillings,' or 240 'pence' or pennyweights; each dwt. was divided into 32 monetary grains (wheat-grains), each equal to 0·703125 modern grain. The Tower weight was abolished in 1527. The Saxon ounce contained 416·5 grains = nearly, Roman uncia = $\frac{1}{12}$ libra; the libra (= 5015 grains) was the Greek-Asiatic and Persian mina of 5015 grains. The Troy lb. is 5760 grains = 12 oz. of 20 dwt. each. Troy weight is now restricted to gold, silver, and jewels, except diamonds and pearls; the latter are weighed in carats (= 3·1683 grains), which were originally $\frac{1}{144}$ the Alexandrian ounce (the twelfth part of the mina of silver). Various larger lbs. were early used for merchandise; in 1303 the 'avoirdupois' lb. (= 7000 grains) was in use. The Troy lb. standard made by Mr Bird in 1758 for the Weights and Measures Committee was legalised in 1824; in 1834 the standard was destroyed; the Standards Commission replaced troy weight by avoirdupois, and the standard lb. is a mass of platinum weighing 7000 grains *in vacuo*, copies of which are distributed as in the case of standards of length. The standard of capacity is the gallon, which was in 1824 adjusted so as to contain 70,000 grains, or 10 lb. avoirdupois of water at 62° F. and 30 inches bar. pressure; this gallon occupying 277·274 cubic inches, instead of the old Winchester gallon of 274¼ cubic inches. The French or Metric system of weights and measures is based on the Decimal System (q.v.); and see METRE, ARE, GRAMME, LITRE.

See Chisholm's *Weighing and Measuring* ('Nature' series), Flinders Petrie in *Ency. Brit.*, Kelly's *Universal Cambist*, Tate's *Modern Cambist*, Reports of the Board of Trade and the Standards Department, Whiteley's *Law of Weights and Measures;* the articles on the various measures; also AVOIRDUPOIS, DEGREE, GRADUATION, GRAVITY, TROY WEIGHT, UNITS, &c.

Weil, GUSTAV, orientalist (1808–89), was of Jewish descent. He studied in Germany, Paris, and the East, and became (1838) librarian and (1861) professor of Oriental Languages at Heidelberg. His chief works are a Life of Mohammed from Arabic sources (1843), histories of the califs (1846–62) and of the Islamitic peoples (1866), &c.

Weimar, a small but interesting town of Germany, capital of the grand duchy of Saxe-Weimar-Eisenach, and residence of the grand-duke, 31 miles E. of Gotha and 155 SW. of Berlin. It stands in a pleasant valley on the left bank of the Ilm; but the environs are in no way remarkable, and the town itself is irregularly and rather poorly built. Though the residence of the court, Weimar carries on neither trade nor manufactures, and seems a dull, provincial-looking town. The lustre conferred on it by the residence here, at the close of the 18th and the earlier portion of the 19th century, of Goethe, Schiller, Herder, and Wieland, at the court of Karl-August, has faded since that group was broken up by death; and now the interest of the place ('Thackeray's 'Pumpernickel') is almost wholly derived from its monuments, traditions, and associations. The town church (*Stadtkirche*), dating from the year 1400, has a 'Crucifixion' by Cranach, and contains a number of memorable tombs, among which are those of Bernhard of Weimar and Herder. The ducal palace, rebuilt in 1790–1803 after the fire of 1774, is a handsome building, some of the apartments of which are decorated by frescoes illustrating the works of Goethe, Schiller, Herder, and Wieland. Other buildings are the Rothes Schloss (1574); the Grünes Schloss, with a library of 180,000 volumes, and relics of Luther and Gustavus Adolphus; the court theatre (rebuilt 1825), where Liszt produced Wagner's *Lohengrin;* and the houses of Cranach, Goethe, Schiller, and Herder. The park and gardens of the palace, within which is the summer residence of Goethe, are much esteemed as a promenade. Pop. (1871) 15,998; (1890) 24,546. See works by Schöll (1857), Gräf (3d ed. 1880), Springer (1868), and Francke (1886).

Weir, HARRISON WILLIAM, book-illustrator, painter, and wood-engraver, was born at Lewes on the 5th May 1824. From about 1845 he exhibited at the Royal Academy and elsewhere pictures of birds and animals. But he is best known by his drawings and wood-engravings in the *Illustrated News*, *British Workman*, *Band of Hope Review*, *Chatterbox*, *Pictorial Times*, *Field*, *Graphic*, *Black and White;* in various books of natural history and poultry; and in a series of works written by himself, *Animal Stories*, *Bird Stories*, *Our Cats*, &c.

Weismann, AUGUST, biologist, was born in 1834 at Frankfort-on-the-Main, in the lyceum of which city his father was professor of philology. He was educated at the gymnasium till his eighteenth year, studied medicine at Göttingen, and in 1860 became physician to the Archduke Stephen of Austria. This appointment secured time for zoological pursuits, the first outcome of which was a treatise on the *Development of the Diptera.* Impaired sight compelled abandonment of microscopical work for some years, and Weismann turned to the study of the problem of variability of organisms, on which the doctrine of descent with modification is based. The results of this, drawn mainly from observations on caterpillars and other insects exhibiting metamorphosis, appeared in a series of papers issued between 1868 and 1876, of which an English translation by R. Meldola, with prefatory note by Darwin, was published in 1882 under the title of *Studies in the Theory of Descent.* But it is round the answer which Weismann, after many years of research, has given in his *Essays upon Heredity and Kindred Biological Problems* (Eng. trans. vol. i. 1889; 2d ed. 1891; vol. ii. 1892) to the question 'How is it that a single cell of the body can contain within itself all the hereditary tendencies of the whole organism?' that interest and controversy have gathered. In all theories of Heredity (q.v.) biologists have assumed that characters acquired by the individual are transmitted to offspring. This Weismann denies, and, while biologists have concerned themselves with speculation as to the mode by which such transmissions are effected, he challenges them to prove that they are effected at all. The *onus probandi* is thus thrown upon his opponents, whose assumptions must give way to experimental evidence, which alone can determine, and that only after protracted record of cases, whether individually-acquired characters are transmitted or not.

Death, he contends, is not a primary attribute of living matter; the Protozoa, or one-celled organisms, being immortal in so far that they do not die naturally. The Protozoon, a microscopic, jelly-like, apparently—not really—structureless mass, with no seeming unlikeness of parts, multiplies by division. Each half becomes a complete individual, and grows in like manner as the whole to which it belonged, till it also divides, and so on with the

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multiplication of Protozoa *ad infinitum*. It cannot be said of either half that one is parent and the other offspring, for both are of the same age, and only, in a limited sense, as the subdivisions into separate individuals are repeated, can we speak of succession of generations. In these processes there is nothing analogous to death. 'There are,' Weismann says, 'no grounds for the assumption that the two halves of an amœba are differently constituted internally, so that, after a time, one of them will die while the other continues to live. Observations show that when division is almost complete the protoplasm of both parts begins to circulate, and for some time passes backwards and forwards between the two halves. A complete mingling of the whole substance of the animal, and a resulting identity in the constitution of each half, is thus brought about before the final separation' (*Essays*, p. 26, 1st ed.). Consequently, there is unlimited persistence of the individual; potential, although not absolute, immortality so long as life lasts on the earth.

While the one-celled organisms are thus immortal, only the reproductive cells of the Metazoa, or many-celled, are immortal. How has this come about? Weismann accounts for it by the failure of certain Protozoa to divide equally, whereby unlikeness of parts and differences of position of parts resulted. 'The first multicellular organisms were probably clusters of similar cells, but these units soon lost the original homogeneity. As the result of mere relative position there arose division of labour, some of the cells were especially fitted to provide for the nutrition of the colony, while others undertook the work of reproduction' (*Ib.* p. 27). Clearly, those on the outside, being exposed to the direct and constant action of their surroundings, would be the media of nutrition, and the builders-up of the cell-commonwealth. So the result of this cell-clustering would be that the cells fell into two classes, body cells and germ-cells. While the body cells were solely concerned with the nutrition of the organism, losing in this specialisation of function the power of reproduction, that power became concentrated in the germ-cells, or, speaking more precisely, in the germ-plasm, which is located in the nucleus of the germ-cell. It is these germ-cells which are the immortal part of the Metazoa. 'It is necessary to distinguish between the mortal and immortal part of the individual—the body (*soma*) in its narrow sense—and the germ-cells. Death affects only the former; the germ-cells are potentially immortal, in so far as they are able, under favourable circumstances, to develop into a new individual' (*Ib.* p. 122). With increasing subdivision of function there has been increasing modification of the organism, but the twofold classification of the somatic or body cells and the germ-cells has remained. The death of the body cells is involved in the ultimate failure to repair waste, because a worn-out tissue cannot for ever renew itself, and because cell-division has its limits. In brief, death is the penalty paid for complexity of structure. As it is impossible for the germ-cell to be, as it were, an extract of the whole body, and for all the cells of the body to despatch particles to the germ-cells whence these derive their power of heredity (the fundamental idea of Darwin's theory of Pangenesis), the germ-cells, so far as their essential and characteristic substance is concerned, are not derived from the body of the individual, but directly from the parent germ-cell. Heredity, Weismann contends, is secured by the transference from one generation to another of a substance with a definite chemical and molecular constitution—in other words, by the 'continuity of the germ-plasm.' This germ-plasm (which, Weismann's critics argue, runs perilously near a metaphysical concept) is assumed to possess a highly complex but extremely stable structure, so stable 'that it absorbs nourishment and grows enormously without the least change in its complex molecular structure' (*Ib.* p. 271). Of this germ-plasm it is further assumed that a small portion contained in the parent egg-cell is not used up in the construction of the body of the offspring, but is reserved unchanged for the formation of the germ-cells of the following generations. 'One might represent the germ-plasm by the metaphor of a long creeping root-stock from which plants arise at intervals, these latter representing the individuals of successive generations' (*Ib.* p. 266).

Only variations of the germ-plasm itself are inherited, and it is upon these variations that natural selection operates. Variations are due not to the influence of external condition nor to use or disuse of organs, but to sexual conjugation. This process combines two groups of hereditary tendencies derived from the mingled germ-plasms of the male and female parents, resulting in those individual differences which form the material from which new species are produced by the action of natural selection. Those differences multiply in geometrical ratio, so that 'in the tenth generation a single germ contains 1024 different germ-plasms with their inherent hereditary tendencies, and, as continued sexual reproduction can never lead to the reappearance of exactly the same combinations, new ones must always arise' (*Ib.* p. 276).

So the sum of the matter is that natural selection is the dominant factor, that use and disuse of parts and the action of the environment count for nothing, or, at the most, for but a little. Here and there Weismann makes concessions as to the modifying influences of body cells on the germ-cells (*Ib.* p. 170), and as to the ultimate origin of hereditary individual differences in the direct action of surroundings (*Ib.* p. 279), which are a partial surrender of his main contention as to the isolation of the germ-plasm. The vulgar notions concerning the transmission of mutilations and developments of non-vital parts are altogether without evidence, as are the beliefs in coincidence between maternal shocks and impressions and 'birth-marks,' and other malformations in the offspring; but the case is altered when we deal with subtle processes initiating changes in vital parts. It is not easy to reconcile the theory of an insulated 'germ-plasm' with the ceaseless manufacture, secretion, and expulsion of germ-cells, the materials of which are derived from the materials nourishing the entire organism; nor with the subtle influence of the nervous system on the reproductive organs. The chief arguments against Weismann's theory are summarised in the article on Heredity (q.v.), but perhaps the most serious difficulty is in the reconciliation of psychological evolution with the continuity of the germ-plasm. For the researches of Spencer, Balfour, and others have demonstrated that the nervous system had its origin in modifications of the primitive skin due to the direct action of the environment.

Be this as it may, the wide-reaching sociological significance of the doctrine of Heredity—which may be regarded as the physical correlate of Determinism—gives an importance to the labours of Weismann that cannot be overrated, and makes urgent the record of extended observations on the lines already laid down by Galton.

For bibliography of subject, see list of books at end of article HEREDITY; and Weismann's *Essays*, vol. i. pp. 13–15 (ed. 1891), for list of books, reviews, &c. dealing with the theory which have appeared since 1889; also *Nature*, 28th July 1892, for paper showing that pathology opposes the hypothesis of transmission of acquired characters.

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Weiss, BERNHARD, a learned German theologian, was born at Königsberg, 20th June 1827, studied at Königsberg, Halle, and Berlin; became *privat-docent* at Königsberg in 1852, and professor extra-ordinary in 1857; and was called to a chair at Kiel in 1863, to Berlin in 1877, where also in 1880 he became superior consistorial councillor and adviser to the government in spiritual concerns. Of his numerous works three stand among the first in importance of their time: *Lehrbuch der biblischen Theologie des Neuen Testaments* (1868; 5th ed. 1888; Eng. trans. 2 vols. 1882–83), a book unequalled in grasp and insight; *Lehrbuch der Einleitung in das Neue Testament* (1887; Eng. trans. 1887–88), the fullest and best orthodox book on the subject; and *Das Leben Jesu* (1882; Eng. trans. 3 vols. 1883–84), a work neither closely knit in argument nor altogether happy in exposition, yet perhaps, on the whole, the most satisfactory bulwark that has been raised to defend the faith in the cardinal fact of Christianity against its assailants. His earlier books on the Petrine theology (1855), Philippians (1859), the theology of John (1862), Mark (1872), and Matthew (1876) prepared the way for these. Weiss has also prepared the newest editions of Meyer's commentaries on Matthew (1883), Mark and Luke (1878 and 1885), John (1886), Romans (1887), the Pastoral Epistles (1885), the Epistles of John (1888), and Hebrews (1888). His work on the Revelation appeared in 1891; that on the Catholic Epistles in 1892.

Weissenburg. See WISSEMBOURG.

Weissenfels, a town of Prussian Saxony, 35 miles SW. of Leipzig, with miscellaneous manufactures (see FURS) and a pop. (1890) of 23,909.

Weltbrecht, GOTTLOB FRIEDRICH, theologian, was born at Culm, 4th June 1840, studied at Tübingen, and after travels in England and Scotland, and a considerable experience in teaching, settled in 1885 as pastor in Stuttgart. Of his numerous writings need only here be named *Das Leben Jesu* (2d ed. 1883); *Unser Glaube* (1888); *Die Sittlichkeit des Mannes Ehre* (1889).

Weizsäcker, KARL, an eminent German theologian, was born at Oehringen near Heilbronn, December 11, 1822, studied at Tübingen and Berlin, and became successively *privat-docent* in theology at Tübingen (1847), preacher (1848), court-chaplain in Stuttgart (1851), superior consistorial councillor (1859), and successor to Baur in the theological faculty at Tübingen (1861). He edited the *Jahrbücher für Deutsche Theologie* from 1856 to 1878, and made his name widely known by the profound learning and unusual lucidity of his *Untersuchungen über die evangelische Geschichte* (1864), and *Das apostolische Zeitalter* (1886–89). Other writings are on the epistle of Barnabas (1863), on the history of the theological faculty of Tübingen (1877), and a new translation of the New Testament (1875).—His brother, JULIUS WEIZSÄCKER, historian, was born at Oehringen, 13th February 1828, studied theology at Tübingen, but early gave himself to historical studies at Berlin and Paris, habilitated as *privat-docent* in history at Tübingen, and filled chairs successively at Erlangen (1864), Tübingen (1867), Strasburg (1872), Göttingen (1876), and Berlin (1881). He died at Kissingen, 3d September 1889. Already he had written on the origin of the Pseudo-Isidorian decretals, when in 1860 he was called to Munich to undertake under Sybel's direction the editing of the *Deutsche Reichstagsakten*, which the then sitting Historical Commission had determined to publish. Of this vast work he lived to edit six volumes (1867–87; i.–iii., those under King Wenzel; iv.–vi., those under King Ruprecht, 1376–1410).

Welbeck Abbey, the seat of the Duke of Portland, in Nottinghamshire, 3 miles S. of Worksop. Occupying the site of an old Premonstratensian abbey, it came from 'Bess of Hardwick' to her son Sir Charles Cavendish, the father of the first Duke of Newcastle, whose far-away heiress married in 1734 the second Duke of Portland. It stands in a park 10 miles in circumference, and is a stately Palladian edifice of mainly the 17th and 18th centuries, but was greatly enlarged about 1864 by the fifth duke, to whom it owes its semi-underground picture-gallery, ball-room, and riding-school, the last 385 feet long, 104 feet wide, and 51 feet high.

Welcker, FRIEDRICH GOTTLIEB, a great German scholar, was born 4th November 1784 at Grünberg, in Hesse-Darmstadt, studied at Giessen, spent the years 1806–7 in Rome, filled a chair at Giessen, fought against the French as a volunteer in 1814, spent the following winter in Copenhagen writing the life and editing the remains of Zoega, was next called to a chair at Göttingen, and finally (1819) in the newly-erected Prussian university of Bonn, where he laboured till his death, 17th December 1868. His chief works are *Die Aeschyleische Trilogie* (1824–26); *Die Griech. Tragödien mit Rücksicht auf den epischen Cyklus* (3 vols. 1839–41); *Der epische Cyklus oder die Homerischen Dichter* (2 vols. 1835–49); *Griech. Götterlehre* (3 vols. 1857–63). His *Kleine Schriften* (5 vols. 1844–67) contain his contributions to the *Archäol. Zeitung*, *Rhein. Museum*, &c. See the Life by Kekulé (1880).—His brother, KARL THEODOR WELCKER (1790–1869), was an eminent publicist and Liberal politician, filled chairs at Kiel, Heidelberg, Bonn, Freiburg, and edited with Rotteck the *Staatslexikon* (12 vols. 1834–44).

Weld, or WOOLD, also called Dyer's Rocket, Dyer's Weed, and Yellow Weed (*Reseda Luteola*), is a plant of the same genus with Mignonette (q.v.), a native of waste places in England, very common in Germany and in many parts of Europe. It has an upright stem two to three feet high; lanceolate, undivided leaves; and long racemes of small yellow flowers, with four-partite calyx and prominent stamens. It was formerly much used for dyeing, but has been largely superseded by other dyes (see DYEING). The best is grown in France, England, and Holland. Good weld must have flowers of a beautiful yellow or greenish colour, and should abound in leaves; that which is small, thin-stemmed, and yellow is better than that which is large, thick-stemmed, and green.

Dyer's Rocket (*Reseda Luteola*).

Welding. When iron or steel is raised to a white heat it passes into a pasty condition, and in this state two pieces can be *welded*—i.e. firmly united together by pressure or hammering. The welding of two lengths of bar or plate iron can be effected more easily than can a piece of iron to a piece of steel. Mr D. Kirkcaldy has tested a number of welded tie-rods, plates, chain-links, &c., and finds that the tensile strength of a welded joint does not often exceed three-fourths of that of a solid piece of iron of the same section and

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kind. The chain-link welds were, however, an exception to this, some of them being nearly as strong as the solid metal. (See Kirkcaldy's *Strength of Materials*, Lond. 1891.) Iron tubing and other objects have recently been successfully welded by means of the heat of the electric arc, which, however, does not readily admit of an area of more than two square inches being done at a time. (For an account of this method of electric welding, see *Engineering* for December 25, 1891.) Most metals pass too rapidly from the solid to the liquid state to admit of being welded. Horn and especially tortoise-shell among animal substances can be welded when they are softened by heat.

Welhaven. See NORWAY, Vol. VII. p. 534.

Well. See ARTESIAN WELLS, DIVINING-ROD, PUMPS, SPRING, WATER, WELLS.

Welland Canal. See CANAL, p. 699.

Welle, a great river of Equatorial Africa, rising in the Monbuttu country and keeping a mainly westward course to 19° W., where it turns south-westwards, and as Mobangi or U-banghi enters the Congo. Schweinfurth, its discoverer, thought the Welle or Maku joined the Shari, and so fell into Lake Tsad; Stanley held it to be a tributary of the Congo through the Aruwimi; Grenfell proved its connection with the Congo by the Mobangi.

Wellesley, province. See PENANG.

Wellesley, RICHARD COWLEY, MARQUIS, was born in Dublin, June 20, 1760. His father, the first Earl of Mornington (1735–81), was a man of great ability, though chiefly known for his musical attainments. Richard was educated at Eton, then at Christ Church, Oxford, and distinguished himself by his mastery of the classics, and especially by the remarkable excellence of his Latin verse. On his father's death in 1781 he took his seat in the Irish House of Peers, and in 1784 he was returned to the parliament at Westminster as member for Beeralston in Devonshire, sitting later for Saltash and Windsor. He supported Pitt's policy and Wilberforce in his efforts to destroy the slave-trade, and as early as 1786 became one of the Lords of the Treasury, having had the good fortune also to gain the favour of George III. In 1793 he became a member of the English Privy-council and of the Board of Control, and in October 1797 he was selected by Pitt to be Governor-general of India, and raised to the English peerage as Baron Wellesley. At this time the power of England was by no means supreme in India, but at the close of Wellesley's administration in 1805 she had become predominant, the revenue of the company raised from seven to fifteen millions, the foundations of British India securely laid. He cleared out the French from the Peninsula by ordering the Nizam to disband his French contingent of 14,000 men, and sent English soldiers to take their place, and in May 1799 crushed the dangerous power of Tippoo Saib when General Harris took Seringapatam by storm. This year he was made Marquis of Wellesley, and received the thanks of parliament, while later the Court of Proprietors voted him an annuity of £5000. In 1802, mortified by misunderstandings at home, he offered to resign, but was induced to remain because of the threatening clouds on the horizon. The great struggle with the Mahrattas soon broke out, but was closed by the energy of Wellesley and of his younger brother Arthur, afterwards Duke of Wellington. In 1805 Wellesley returned to England, where he never overcame the mortification of finding that he no longer stood first of men as he had done in India. He chafed much under the attacks on his administration which were made in parliament. In 1809 he went as ambassador to Madrid to urge a more vigorous support to his brother in the struggle within the Peninsula against the French, and on his return was made Foreign Minister and a Knight of the Garter. He became Lord-lieutenant of Ireland in 1821 and again in 1833. He died at Kingston House, Brompton, September 26, 1842, and by his own desire was buried in the chapel of Eton College.

See the *Memoirs and Correspondence*, edited by Robert R. Pearce (1846); the *Despatches, Minutes, and Correspondence*, edited by Montgomery Martin (1840); and the study in the 'Statesmen' series, by Col. G. B. Malleson (1889).

Wellhausen, JULIUS, a learned Old Testament scholar, was born at Hameln, 17th May 1844, studied at Göttingen under Ewald, became *privatdocent* there in 1870, and ordinary professor of Theology at Greifswald in 1872. He resigned in 1882 from conscientious reasons, first became professor extra-ordinary in Philology at Halle, and in 1885 ordinary professor of Oriental Languages at Marburg. He has made his name widely known by his equally able and uncompromising application of the views of Graf and Kuenen to the fundamental problems of Old Testament history.

His books are *Der Text der Bücher Samuelis* (1872), *Die Pharisäer und die Sadduzäer* (1874), *Geschichte Israels* (vol. i. 1878, rewritten as *Prolegomena zur Geschichte Israels*, 1883; Eng. trans. 1885), *Skizzen und Vorarbeiten* (4 parts, 1884–89), *Muhammed in Medina* (1882), and *Die Komposition des Hexateuchs* (1889). Wellhausen also edited the 4th and 5th editions of Bleek's *Einleitung in das Alte Testament* (1878, 1886).

Wellingborough, a market-town of Northamptonshire, on a declivity near the confluence of the Ise with the Nen, 10½ miles ENE. of Northampton. Almost destroyed by fire in 1738, it has a chalybeate spring (the 'Red Well'), said to have been resorted to by Charles I. and Henrietta Maria; a large and imposing parish church (restored 1861–74), mainly Decorated and Perpendicular in style; a corn exchange (1861); a grammar-school (1595), transferred to new buildings in 1880; and important industries of boot-making, iron-smelting, &c. Pop. (1851) 5061; (1891) 15,068.

Wellington, a market-town of Shropshire, 2 miles NE. of the conspicuous Wrekin (1320 feet) and 10 E. of Shrewsbury. It stood near the ancient Watling Street, hence its name 'Watling Town.' Situated in a populous mining and agricultural district, it has manufactures of nails, farm implements, &c., an Italian town-hall built in 1867 at a cost of £10,000, and a corn exchange (1868). Pop. (1851) 3926; (1891) 5831.

Wellington, a market-town of Somerset, 7 miles SW. of Taunton, near the Tone and the foot of the Black Downs (900 feet), which were crowned in 1817 by a Wellington obelisk. The 'Great Duke' took for some unknown motive his titles from this place; and its manor (held formerly by King Alfred, Asser, Aldhelm, the Protector Somerset, the Pophams, &c.) was purchased for him in 1813. The large Perpendicular church has a Jacobean monument to Chief-justice Popham; and T. S. Baynes was a native. Serges and other woollen goods are manufactured. Pop. (1851) 4601; (1891) 6808. See A. L. Humphrey's *History of Wellington* (1890).

Wellington, the capital of New Zealand, on Port Nicholson, an inlet of Cook Strait, on the southern coast of the North Island, 180 miles by sea from New Plymouth, and 150 miles from Nelson. It was the first settlement of the New Zealand Company, and was planted under the direction of Colonel Wakefield, with a band of pioneer colonists, in 1840. The harbour is a fine

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expanse of water 6 miles long and 5 broad, and has an excellent wharf, affording accommodation to ships of any tonnage. After the removal of the seat of government hither in 1865 the town made rapid progress; it possesses a number of good public buildings, including Government House, Houses of Legislature, government buildings, post-office, college, museum, hospital, and many banks, clubs, theatres, hotels, and insurance offices. The streets are generally wide, and have good dwelling-houses. Wellington is the seat of Anglican and Catholic bishops, and possesses two cathedrals, together with about twenty other places of worship. There is a railway to the interior. Wellington is also connected by steamers with the chief ports of New Zealand, and with Melbourne and Sydney. Amongst the industries are tanning, brewing, candle and soap works, boot-factories, meat-preserving, and shipbuilding. There is a public park, and the botanical gardens have an area of 100 acres. The suburb of Newton or South Wellington is connected by tramway with the older town. Pop. (1888) 28,000; (1891) 31,021, or with suburbs, 33,224.

Wellington, Duke of, the Hon. Arthur Wellesley (or Wesley), was third of the four sons who reached man's estate of Garret, first Earl of Mornington, of Dangan Castle, County Meath, and Anne Hill, daughter of Lord Dungannon. He was born on 29th April 1769, according to a committee of the House of Commons which had to decide, in April 1790, whether or not he was then of age, and therefore eligible to take his seat. But Lady Mornington always insisted that he was born on May-day 1769, and the duke himself kept that day as his birthday, though his baptismal certificate is dated April 30. The place of his birth, too, is somewhat doubtful, but it was probably Mornington House, 24 Upper Merrion Street, Dublin, and not Dangan Castle, as sometimes stated. It is remarkable that the same year produced his great antagonist Bonaparte, and that similar uncertainty exists as to the date of his birth, now allotted to August 15. His three brothers were all men of mark and eminent scholars, but he was for many years considered the dunce of the family, and was by no means a favourite with his mother.

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He went first to school at Chelsea and then to Eton, distinguishing himself at neither as regards learning, but gaining some renown at the latter by fighting 'Bobus' Smith, brother of the witty Canon Sydney Smith of St Paul's. From Eton he went to a French military school at Angers for about a year, was 'not very attentive to his studies,' and rather weak in health, but acquired a useful knowledge of the language.

On 7th March 1787 he received his first commission as ensign in the 73d Foot. His eldest brother Richard, Earl of Mornington since his father's death in 1781, watched over him and gave him the benefit of his great political and social influence, so that he soon became lieutenant in the 76th Foot, then in the 41st Foot, and then in the 12th Light Dragoons. From captain in the 58th Foot, he went in 1792 to the 18th Light Dragoons. Then, being promoted into the 33d Foot as major, he purchased the lieutenant-colonelcy of that regiment in September 1793, with money provided by his brother. In the meantime he had served as aide-de-camp to two viceroys of Ireland, Lords Westmoreland and Camden, and entered parliament as member for Trim. In 1796 he became engaged to the Hon. Catherine Pakenham, third daughter of Edward Michael, second Lord Longford; but they were not allowed to marry until 10th April 1806, when he returned from India a major-general and victor in several great battles. Up to 1793, when he assumed command of the 33d Regiment, he had been considered dull, idle, and perhaps frivolous, but he soon showed very different traits, and worked so earnestly and wisely that his regiment was in a few months officially declared to be the best drilled and most efficient in the Irish command. In 1794 a force under Lord Moira was despatched to succour the Duke of York, who, beaten at Oudenarde, was retiring on Antwerp. Here the 33d joined the army, and its commander, who had resigned his seat in parliament in order to lead it, commenced his war service by taking part in a retreat, for the French had cut the allies in two, the Austrians retiring by Maestricht, the British towards Holland. The first engagement in which Arthur Wesley, as he then signed himself, took part was during the retreat of General Abercrombie's brigade from Boxtel, which place they had tried to retake, but without success. The 33d were in support, and by their steady fire, added to the skilful way in which they were handled, were able to beat off the enemy at a very critical moment. Wesley's coolness and promptitude on this occasion were noticed by his superiors, and he was selected to command the rear-guard, and faithfully fulfilled this arduous task. The retreat was made in winter weather of unusual severity, and great privations were endured. The superior officers, too, of this unfortunate expedition were criminally careless and indolent, so that the final escape of the army to its ships in the spring seemed to Wesley almost miraculous. So great was his disgust at the way this affair had been mismanaged that, on reaching his home at Trim, he applied for civil employment, indicating the Revenue or Treasury Board as his preference. But his request was not complied with, and soon after he was ordered with his regiment to the West Indies. They embarked, but after striving in vain for six weeks to get out of the Channel, returned to Spithead. He then led the 33d to Poole, and there became so seriously ill that he could not embark when, in January 1796, the regiment started for the East Indies. However, by taking passage on board a swift man-of-war, he overtook it at the Cape, and landed with it at Calcutta in February 1797. Within two months he was nominated to command an expedition against Manilla; but the troops were recalled when they had but reached Penang. He occupied himself in compiling regimental orders for troops on board ship, and wrote papers on Pulo-Penang and on Bengal, which showed great talent as a financier. He also wrote on the necessity of expelling the French from Mauritius, and on many other subjects connected with the government of India. At the same time he energetically protected the interests of his men whenever threatened.

In the winter of 1797 he visited Lord Hobart at Madras, and his military memoranda of that date show how customary it was with him to study the topography of any country he might be in, a habit which led him, three years beforehand, to select the field of Waterloo as the spot on which a battle for the defence of Brussels against an invasion from the south ought to be fought.

On 17th May 1798 his brother, Lord Mornington, landed at Calcutta as governor-general. A letter written on this occasion was the first signed 'Arthur Wellesley,' a spelling which, following the usage of his family, he henceforward adopted. Lord Mornington found the British settlements, then a mere fringe on the edges of India, in considerable danger. Bonaparte was in Egypt, threatening to attack India, and Tippoo, sultan of Mysore, was coquetting with the governor of Mauritius, by whose aid he hoped to drive the British out of the country. After some months of vexatious delay, utilised, however, in prepara-

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tions and much diplomatic fencing, an expedition against Tippoo was set on foot. Wellesley and the 33d were despatched from Calcutta to Madras. The transport ran on the Ságar reef in the Hooghly, but soon got off undamaged. It took six weeks to perform the voyage, and all on board suffered from dysentery, fifteen men dying owing to the bad water. On 29th January 1799 General Harris took command, and General Stuart, with 6000 men, prepared to co-operate with him from Bombay in an attack upon Seringapatam, but was himself assailed without success, on 6th March, by Tippoo. Three weeks later General Harris' army, after capturing many fortified posts, met the sultan near Malvalli, on the right bank of the Maddoor. Wellesley, in command of the left brigade, moved in echelon, the 33d leading, against Tippoo's right, and his vigorous onset, combined with the charge of General Floyd's cavalry brigade, routed the enemy in less than two hours. His loss was but a few score in killed and wounded, the enemy's nearly 2000. General Harris then outmanœuvred Tippoo and invested him in Seringapatam. A night attack in two columns, on 5th April, against the outposts was only partially successful. The column led by Wellesley failed to find the post and got into confusion. Next day, however, the same troops carried the post with ease and little loss. Wellesley, who had been slightly wounded in the knee, was much mortified at his first failure. At the final assault, when Tippoo was slain, he led the reserve column, and took command of the place after its capture. By vigour and justice he put a stop to the great disorder which ensued, and restored confidence amongst the people. During three months as governor of Seringapatam he found himself engaged in numberless ways, as soldier, engineer, statesman, traffic-manager, and even sanitary authority. He had to bury Tippoo with due pomp, see to the removal and pensioning of his sons and wives, restore the old Hindu dynasty, and control the distribution of over a million sterling of prize money. In administering the affairs of the place he showed great capacity, and his opinion was sought in settling the future of the conquered province.

On 24th August 1799 he was appointed to command the troops in Mysore in General Harris' place, and engaged in the onerous work of establishing tranquillity there. The principal cause of trouble was a Mahratta freebooter, Dhundia Wágh, who had collected some 5000 men and six guns, and executed numerous successful raids. After hunting him from 15th June to 10th September, Wellesley, at the head of four regiments of cavalry, and without waiting for his infantry, dashed upon him, killed him, and dispersed his following. In the camp his little son was found, of whom Wellesley took charge and was mindful in after years. When he quitted India he left some hundreds of pounds to be expended upon the boy, who died in 1822 of cholera. Prevented by illness from joining Baird's expedition from Kosseir to the Nile, Wellesley remained two years longer in Mysore, and on 29th April 1802 was promoted major-general.

The treaty of Bassein (December 31, 1802), which made an ally of the Peshwá, consolidated British power in India, but soon necessitated military operations against the rival Mahratta chiefs, Sindhia and Holkar, by whom he had been deposed. At the request of Lord Clive, General Wellesley was given the command of a mixed force some 10,000 strong, with which he covered 600 miles in forty-two days, and entered Poona, the Mahratta capital, on 20th April 1803. In the last march he rode with the cavalry alone 60 miles in thirty-two hours, and by his sudden appearance saved the city from being burned by Holkar's lieutenant Amrut Rao. Behind him he left posts, and arranged for the construction of basket-boats, so as to be able to continue his operations during the rainy season. For some time he occupied an isolated and dangerous position, threatened by the disaffected chiefs from the north and separated from a second division coming from the west under Colonel Stevenson. At length having received full political powers, he called upon Sindhia to withdraw north of the Nerbudda, and on his failing to do so declared war against him on 6th August 1803. General Wellesley moved at once, captured Ahmadnagar on the 11th, crossed the Godavari on the 21st, and on the 23d found himself confronted by the combined forces of Sindhia and the rajah of Berar at Assaye. Their numbers have been estimated at from 40,000 to 50,000, with a hundred guns. Judging that bold action was the safest, though the enemy's position was strong, he attacked at once, and after a much more serious battle than any which had hitherto been fought in India gained a complete victory, capturing all the Mahratta guns. His loss was 2500 out of a force little exceeding 7000 men. Stevenson's division having effected a junction with him pursued the enemy, and Wellesley finished the campaign by the victory of Argaum and the storming of Gáwilghar in December. The treaties with Sindhia and the rajah of Berar were signed by him, and the Mahratta power was completely broken.

His despatches concerning these matters and Indian policy generally show him to have been one of the ablest of administrators. Now Sir Arthur Wellesley, K.C.B., he returned home early in 1805, and accompanied the abortive expedition to Hanover. The following year he entered parliament again as member for Rye, and in 1807 was appointed Irish Secretary, but after a few months was sent to Copenhagen, where he commanded the troops which drove the Danes out of Zealand. He then returned to the Irish Office, but in July embarked with some 10,000 men for the relief of Portugal. His army landed at Mondego Bay early in August, and on the 17th he defeated the French under Junot at Roliça. On the 21st he inflicted a second defeat upon them at Vimiera, but was superseded during the battle by Sir Harry Burrard. He, contrary to Wellesley's advice, concluded the convention of Cintra, which ensured the evacuation of Portugal indeed, but saved the French from capitulation—the inevitable result if his plans had been adhered to.

Recalled to England to give evidence before the court of inquiry into the circumstances connected with the convention, by which he was fully exonerated, he took up his Irish duties again during the winter of 1808-9, while Sir John Moore's campaign was going on. But after its failure he was given the chief command in the Peninsula, and landed at Lisbon on 22d April 1809. Then began that marvellous display of generalship, foresight, and tenacity of purpose which, ending in the expulsion of the French from Spain and the capture of Toulouse on 12th April 1814, is known by the name of the Peninsular War (q.v.). The honours conferred upon him were numerous. He became Lieutenant-general on 26th April 1808 and G.C.B.; Baron Douro of Wellesley, county Somerset, and Viscount Wellington of Talavera and Wellington in the same county on 4th September 1809; Earl of Wellington on 28th February 1812, and Marquis on 3d October; Field-marshal on 3d July 1813; Marquis Douro and Duke of Wellington on 11th May 1814, and Knight of the Garter. He was also made Duke of Ciudad Rodrigo, Magnate of Portugal, and Grandee of the first class in Spain; Duke of Vittoria, Marquis of Torres Vedras, and Count Vimiera in Portugal; and received all the

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most distinguished foreign orders, including the Golden Fleece. It is remarkable that he took the place amongst the knights of the Bath rendered vacant by the death of Lord Nelson. The duke reached Paris early in May, and after a short visit to Madrid, where he gave good but unheeded advice to King Ferdinand VII., returned to England after an unbroken period of five years' active service.

He was heartily welcomed home. From Westminster Bridge, on 23d June 1814, the crowd dragged his carriage to the duchess's house in Hamilton Place. On the 24th he joined the Regent and his royal guests at Portsmouth, and then took his seat in the House of Peers. A committee of fifteen from the House of Commons presented the thanks and congratulations of that assembly, and on 1st July from a place inside the bar he thanked them for the grant of £400,000 voted on 12th May. A week later he carried the sword of state at the solemn thanksgiving service in St Paul's, and was entertained soon after by the city at the Guildhall.

Very soon afterwards he was sent as ambassador to Paris, where he was naturally ill received. Realising this, Lord Liverpool offered him the American command, but he declined to quit Europe, and remained at his post until the early part of 1815, when he took Lord Castlereagh's place at the Vienna congress. On 7th March of that year he heard by courier from Florence that Napoleon had quitted Elba. The allies at once directed their forces against France. Wellington took command of the army in the Netherlands, arriving in Brussels on 4th April. It was a hard task to form this army, but by the end of May he had under him 150,000 men—British, Hanoverians, Brunswickers, Nassauers, and Dutch-Belgians. The last were favourably inclined towards the French, and only about one-third of the whole was available for field-service. Blücher with 116,000 Prussians was, however, ready to act and in communication with him. Failing to induce the allies to negotiate, Napoleon quitted Paris on 12th June and threw himself upon Blücher and Wellington. On the 16th he defeated the former at Ligny, whilst Ney pressed hard upon the latter at Quatre Bras. But designing to fight in conjunction on the chosen position of Mont St Jean, the allies retired so as to effect this object, with the result that the French army was totally routed on the 18th June in the famous battle of Waterloo (q.v.). Paris capitulated on 3d July, and Napoleon surrendered to the captain of H.M.S. *Bellerophon* at Rochefort.

Wellington was created Prince of Waterloo in the Netherlands, the estate of Strathfieldsaye, in Hampshire, purchased from Lord Rivers for £263,000, was presented to him by the nation, and his career of active service ended. Except Frederick the Great and Bonaparte in Italy, no general of modern times had done so much with such scanty and uncertain resources. But owing to the fact that the emperors of Austria and Russia were still at Nancy, Wellington in Paris held a most important position. In order to meet the hostility of the latter sovereign to Louis XVIII. by conciliating the French troops and populace, he found it expedient to appoint the powerful but infamous Fouché minister to the king, and in the subsequent treaty withstood the demand of Prussia for the cession of Alsace and Lorraine. He had already saved the Bridge of Jena from the destruction with which it was threatened by Prussian patriotism. Appointed commander-in-chief of the joint army of occupation, he exercised a very salutary influence in the royal counsels, besides reconstructing the military frontier of the Netherlands, and performing the other duties of the post. He had many enemies in Paris. An attempt to set fire to his house on the night of the 25th June 1816 nearly succeeded, but fortunately he was giving a ball, and his servants at once detected the smell of fire before it reached the barrels of oil and bottles of gunpowder which had been maliciously placed in the cellar. On the night of the 11th February 1818 a jolt of his carriage saved him from the bullet of the assassin Cantillon, which passed through both windows. In this year when the French had, by the help of Messrs Baring, paid all the indemnities, the congress of Aix-la-Chapelle, acting on his advice, terminated the occupation originally fixed for five years.

Returning to England he joined Lord Liverpool's cabinet as Master-general of the Ordnance. In 1826 he was made Constable of the Tower, and the following year Commander-in-chief. He represented Great Britain at the congress of Verona on the death of Lord Castlereagh, and was able to prevent any joint interference with the affairs of Spain. As a member of Lord Liverpool's administration, he agreed to the St Petersburg protocol of 4th April 1827, designed to urge upon Turkey the Greek claim to autonomy, but without threats of intervention. On Canning's becoming prime-minister and going beyond this he withdrew from the cabinet, resigning the offices of Master-general of Ordnance and Commander-in-chief. Canning then concluded the treaty of London on 27th July, binding France, England, and Russia to enforce the protocol. This, as Wellington had foreseen, brought about the battle of Navarino.

On the death of Canning in August 1827, and the fall of Lord Goderich's cabinet in January following, the duke became prime-minister—only, however, at the king's earnest desire. He disappointed the Tories by advising the Lords not to oppose the Test and Corporation Acts which had been passed in the Lower House, and by a quarrel with Huskisson lost his support and that of all the Liberal members of his cabinet. Becoming, with Peel, convinced that Catholic emancipation was necessary, he brought in a bill to grant it in 1829. As he had always hitherto opposed such a measure, he incurred thereby much odium; and the Earl of Winchilsea published a letter accusing him of a design to introduce Popery. The duke thereupon called him out, and a duel with pistols was fought in Battersea Fields—his first and only duel. The duke intentionally fired wide and the earl fired into the air, so that no harm ensued, and the calumnies ceased (see Vol. IV. p. 108). Desiring to work for the good of the country alone, and not as a party man, he could not work harmoniously with his colleagues. By withdrawing, after Navarino, from intervention in the East, he lost the power of moderating Russian influence there. In Portugal he was favourable to Dom Miguel and the absolutists, and generally showed little sympathy with national causes. Failing to recognise the earnestness of the demand for parliamentary reform in 1830, he declared against it, and thus brought about the fall of his government, becoming so unpopular that he was hooted by the mob on the anniversary of Waterloo, and the windows of Apsley House broken, so that he had them protected with iron shutters. On the occasion of a visit he paid to Lincoln's Inn the mob were so threatening that he had to be escorted home by the lawyers.

Again called upon by King William IV. in 1834 to form a cabinet, he recommended Peel as prime-minister, reserving for himself the post of Foreign Secretary. Sir Robert was in Italy, but the duke was sworn in as First Lord and Secretary of State for the Home Department, so as to enable him to act in all the other offices until Peel's return in three weeks' time. This brief dictatorship greatly raised his reputation as a statesman. In January 1834, too, he had been chosen Chancellor of the

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university of Oxford. Sir Robert Peel resigned in April 1835, but returned to power in 1841. Wellington joined his cabinet, but with no office except that of Commander-in-chief, and supported his Corn-law legislation. On his defeat in 1846 the duke retired from public life. He had been made Lord High Constable of England and again Master-general of Ordnance in 1838, and in 1842 Commander-in-chief by patent for life. In 1848 he organised the military in London against the Chartists in such a way that, without showing a soldier or a gun, the city was fully protected.

As age crept over him he became irritable about trifles and rather deaf, but retained his patience in grave matters and his keen eyesight. His last important service was a letter upon the defenceless state of the south coast, addressed to Sir John Burgoyne, which had great results. On 1st May 1850, his birthday, a prince was born to whom he stood sponsor and gave his name. At the opening of the Exhibition of 1851 he walked in the procession, but on 14th September the following year faded peacefully away in his armchair at Walmer. After lying in state at Chelsea Hospital, he was buried with great pomp in St Paul's. All European nations, except Austria, were represented at the funeral, and it was felt by all that a great captain and a supremely dutiful, honest man had passed away. The monument to his memory, by Alfred Stevens (q.v.), is an imposing tribute to his worth. As regards his personal appearance and character: before age had bowed his figure, his height was 5 feet 9 inches, his build slight, but with square shoulders and a good chest. His eyes were violet-gray, clear, and penetrating; his nose, Roman; hair, brown; and his whole countenance, which has been compared to Cæsar's, expressive of great power and resolution. Though accused of want of feeling, there are many instances of the 'Iron Duke' being much affected by the loss of friends, and his charity, though unostentatious, was profuse. Mr Gleig asserts that he gave away £4000 in one year. He was a man of the strictest integrity and devotion to duty. In everything he looked upon himself as a servant of the sovereign, and never allowed personal considerations to sway his opinions or actions.

Besides the many honours already mentioned, he was colonel of the Grenadier Guards, colonel-in-chief of the Rifle Brigade, Lord Warden of the Cinque Ports, Commissioner of the Royal Military College and Military Asylum, lord-lieutenant of Hants, chief ranger and keeper of Hyde and St James's parks. His duchess had died on 25th April 1831, leaving three sons and three daughters. To one of the latter Her Majesty Queen Victoria stood sponsor in person. His eldest son was Arthur Richard, second Duke of Wellington, K.G., &c., born 3d February 1807. He died without issue 13th August 1884, and was succeeded by his nephew Henry, second son of Major-general Lord Charles Wellesley.

A good account of his life and campaigns by Rev. C. N. Wright appeared in 1841. Other biographies have been written by Rev. G. R. Gleig (a personal friend), General Brialmont of the Belgian army, Messrs. Yonge, G. L. Browne, G. Hooper, and others. His despatches, edited by Colonel Gurwood, are in themselves a military autobiography, supplemented as they have been by others edited by his son, who also published his speeches.

Wellington College, in Berkshire, 4 miles SSE. of Wokingham, a public school founded in 1853, in memory of the Duke of Wellington, from funds raised by public subscription. The foundation-stone was laid by Queen Victoria in 1856, and it was opened by her in 1859. It has ninety scholarships for the sons of deceased army officers, twelve exhibitions, seven open scholarships, and over 400 boys, the foundationers being boarded and educated for £10 per annum and non-foundationers for £110.

Wellingtonia. See SEQUOIA.

Wells, streams, and lakes among primitive peoples are usually regarded as infested by local nature-spirits, kind or cruel, to which offerings may be made. The savage invests everything with personality and life, and what is poetry to us is philosophy to him. The Ganges is still a sacred stream even to the civilised Hindu, and we need not be surprised to find the Xanthos or Scamander among the Homeric Greeks provided with its priest and appeased with sacrifices. Melusine (q.v.); the water-kelpie, for which it came out before the Crofters Commission in 1888 that a loch in the Gairloch district had been trawled and quicklimed in vain not twenty-five years before; and the sea-serpent seen every now and then on our shores show the malignant side of this nature-superstition, just as its more beneficent aspects are seen in our healing-wells and wishing-wells, in the 'well-wakes' that lingered in corners of Shropshire into the 19th century, and the floral-offerings—'well-dressings' of Derbyshire (notably at Tissington), Staffordshire, Westmorland, and north Lancashire, to which Milton alludes in *Comus*. Christianity only substituted a saint's name for the indigenous nature-deity, and water-worship held its place—in Brittany, in Ireland, in St Chad's baptismal well at Lichfield, St Milburga's at Much Wenlock, and hundreds of other places. The worship of fountains is condemned in the canons of St Anselm (1102), but continued for centuries afterwards. In St Bede's well, near Jarrow, weakly children are dipped and crooked pins offered; at St Helen's well in Yorkshire pieces of cloth are offered; Fergan well near the Scotch Avon was good for skin diseases and running sores; St Dwynwen's well in Anglesea was good against love-sickness, St Cynhafal's in Denbighshire against warts; at Sefton in Lancashire there is a well into which maidens throw pins in order to divine the date of marriage and test the fidelity of their lovers. Ailing children were carried to St Anthony's well at Maybole on the first Sunday of May; the well at Trinity Gask in Perthshire was sought on the first Sunday of June. The well of St Keyne (q.v.) in Cornwall had peculiar properties of special interest to husbands and wives. The most famous of all in England is that at Holywell which sprang up of itself at the place within St Beuno's Church to which rolled the head of St Winifred when struck off by Caradog ab Alan. The flow of water has never since ceased, and in 1876 the well was leased to the corporation of Holywell by the Duke of Westminster for a thousand years at a sovereign a year. There is but one story against its virtue told by Lilly of Sir George Peckham, who died in the well in 1635, 'having continued so long mumbling his pater nosters and "Sancta Winifreda, ora pro me," that the cold struck into his body, and after his coming forth of that well he never spoke more.' At St Tecla's well in Denbighshire a man could transfer his epilepsy to a cock after bathing in the well. Richard Baxter when a schoolboy heard a well at Oundle in Northamptonshire emit a noise like a drum about the time the Scots came into England, and was told the same well drummed again when Charles II. died. St Elian's in Denbighshire is the chief of the 'cursing-wells' of Wales, and it is possible to make an enemy pine by casting into it a pin and a pebble inscribed with his name.

See folklore books by Brand, Henderson, C. S. Burne, Dr Gregor, Wirt Sikes, and W. G. Black.

Wells, the city of Somerset, pleasantly situated at the foot of the Mendip Hills, 20 miles SW. of

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Bath and 20 (30 by rail) S. of Bristol. Here, near St Andrew's Well, from which and other springs the place took its name, King Ina in 704 established a house of secular canons; but the see was first founded in 909 by Edward the Elder, and the city has grown up round the cathedral. The see was translated to Bath during the first half of the 12th century, and still is styled Bath and Wells, though Bath's connection has been purely titular since the Reformation. Among its seventy bishops have been Jocelin (1206–42), the 'second founder' of the cathedral, Fox, Wolsey, Barlow, Laud, and Ken. That cathedral, though one of the smallest yet perhaps the most beautiful of English cathedrals, is mainly Early English in style, and is 371 feet long, by 123 across the transept, while the height of the central tower is 160 feet, of the two western towers 130. Its principal glory is the west front, with its matchless sculptures (600 figures in all, of which 151 are life-size or colossal); but other features are the north porch, the inverted tower arches, the east Jesse window with its splendid old glass, the exquisite lady chapel, and the octagonal chapter-house with its windows and central column in the perfect style of 1300. Other buildings, all of extreme interest, are the moated episcopal palace, with an undercrypt of about 1220; the deanery, rebuilt by Dean Gunthorpe in the reign of Edward IV.; the archdeaconry, now remodelled as a theological college; the gateways; and St Cuthbert's Church, with a noble west tower. Chartered by King John in 1202, Wells lost one of its members in 1867, and the second in 1868. Pop. (1851) 4736; (1891) 4822.

See works by Britton (1821), Cockerell (1851), Parker (1860), Freeman (1870), Reynolds (1881), and Jewers (1892).

Wells, CHARLES JEREMIAH, an English poet, who has been till lately strangely neglected by his countrymen, was born in London in 1800. He was a school companion of R. H. Horne and Keats's brother at Enfield, and at the age of fifteen sent Keats a present of flowers, which the poet acknowledged in the sonnet beginning 'As late I rambled in the happy fields.' A few years afterwards he quarrelled with Keats, and his *Stories after Nature*, fantastic and sometimes graceful tales in poetic prose, showing strangely the influence of Leigh Hunt, were written, it is said, to show Keats that he 'could do something.' The book, which was published in 1822, fell still-born, and was followed in 1824 by the noble biblical drama, *Joseph and his Brethren*. The poem attracted no attention, and remained practically unknown until attention was directed to its consummate beauties by Mr Swinburne in an article in the *Fortnightly Review* of 1875; his attention had been called to it by Rossetti. On the failure of his verses to attract notice, Wells abandoned literature. He adopted law as his profession, went to Brittany in 1840, and finally settled at Marseilles, where he died on February 17, 1879. *Joseph and his Brethren* is one of the finest dramatic poems in the language. The verse is fiery with passion and rich even to overrichness in graceful and glowing imagery. In one character, the heroine, Phraxanor, the writer shows a truly wonderful strength and subtlety of dramatic insight. Only once before, says Mr Swinburne, has such a character been given with supreme success—viz. in Shakespeare's Cleopatra. It may be, he adds, that only the dullness of fashion has kept out of sight 'a poet who was meant to take his place among the highest.'

Besides Mr Swinburne's article, see two articles by Theodore Watts in *The Athenæum* (1876, 1879); *The Academy* for March and April 1879; Mr Buxton Forman in Miles's *English Poets of the Century;* and Linton's preface to a new edition of *Stories after Nature* (1891).

Wellsville, a town of Ohio, on the Ohio River, 48 miles by rail WNW. of Pittsburgh, with steel and other mills, foundries, and terra-cotta works. Pop. 5247.

Welsh, or WELCH, JOHN (1570–1622), Presbyterian divine, was minister of Ayr from 1590 till his imprisonment by James VI. in 1605 for defying the king in defence of the church's independence, and then preached to Huguenot congregations at various towns in France till 1622, when he passed over to London. From him and his wife, a daughter of Knox, Mrs Carlyle claimed descent. See Young's Life of him, edited by Anderson (1866).

Welsh Language. See WALES.

Welsh Onion, or CIBOL (*Allium fistulosum*), a perennial plant, a native of Siberia, with fistular leaves and no bulb, and a flavour resembling garlic. It is cultivated in various parts of Europe, including England. 'Welsh' here only means, as it used to do, 'foreign' (like the German *Wälsch*).

Welshpool, a town of Montgomeryshire, North Wales, near the left bank of the Severn, 20 miles W. by S. of Shrewsbury. It has a parish church (restored by Street), a town-hall and market (1873) with a clock-tower 90 feet high, and the Powysland Museum (1874); whilst 1 mile south is Powis Castle, dating from the 12th century, with a fine picture-gallery and park—the seat from Elizabeth's time of the Herberts, as now of their and Clive's descendant, the Earl of Powis. The flannel manufacture has migrated to Newtown. Incorporated by James I. in 1615, Welshpool is one of the six Montgomeryshire (q.v.) boroughs. Pop. (1851) 6564; (1891) 6489.

Welwitschia (named after Friedrich Welwitsch, Austrian traveller, 1806–72), a genus of African Gymnosperms (q.v.) belonging to the Gnetaceæ (see SEA-GRAPE), and containing only one species (*W. mirabilis*). The stem of this remarkable plant may when mature be little over a foot high but several feet across. It bears but two leaves, the cotyledons, which sometimes grow to be 5 or 6 feet long and 2 or 3 wide, ultimately splitting into strips. The plant is said to live over 100 years. The flower consists of a panicle of brilliant overlapping scarlet scales.

Wem, a market-town of Shropshire, on the Ellesmere Canal, 11 miles N. by E. of Shrewsbury. Pop. 2600.

Wemyss, FRANCIS WEMYSS CHARTERIS DOUGLAS, EARL OF, a father of the volunteer movement, was born 4th August 1818 and educated at Eton and Christ Church, Oxford. He sat in parliament for a division of Gloucestershire in 1841–46, followed Sir Robert Peel on the repeal of the Corn Laws, and sat for Haddingtonshire as a Liberal Conservative from 1847 till in 1883 he succeeded his father as ninth earl. As Lord Elcho he was a Lord of the Treasury in the Aberdeen Ministry from 1852 till 1855. He took a very prominent part in the volunteer movement, frequently presided over the rifle meetings at Wimbledon, and wrote *Letters on Military Organisation* (1871).

Wen-chow (*Wan-chau*), a Chinese treaty port in the province of Cheh-kiang, at the head of a bay or estuary. Pop. 80,000.

Wendover, a village and parish of Bucks, under the Chiltern Hills, 5 miles SE. of Aylesbury; pop. 2000. It sent members to parliament till 1832. For Roger of Wendover, a monk of St Albans, who died 1236, see PARIS (MATTHEW).

Wends, the name given by the Germans to a branch of the Slavs (q.v.) which, as early as the 6th century, occupied the north and east of Germany from the Elbe along the coast of the Baltic

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to the Vistula, and as far south as Bohemia. They were divided into several tribes, which were successively subdued by the Germans, and either extirpated or gradually Germanised and absorbed more or less perfectly. In a narrower sense the name of Wends is given to those remnants of the Slavic population of Lusatia (q.v.) who still speak the Wendish tongue, and preserve their peculiar manners and customs. Of these Lusatian Wends or Sorbs, Upper and Lower, there were in 1889 in Saxony 56,000, in Prussia 103,000. Outside Lusatia there were 3400 in Saxony, 1000 in Prussia, 3000 in foreign parts.

Of the language there are grammars by Seiler (1830), Jordan (1841), F. Schneider (1853), Pfuhl (1867), and Liebsch (1884); dictionaries by K. Bose (1840), Zwahr (1847). Schmaler's *Volkslieder der Wenden* (2 vols. 1843) is more trustworthy than Veckenstedt's *Wendische Sagen, Märchen, &c.* (1879). See also L. Giesebrecht, *Wendische Geschichten aus den Jahren 780–1182* (3 vols. 1841–43); R. Andree, *Das Sprachgebiet der Lausitzer Wenden* (1873); Schulenberg, *Wend. Volkstum* (1882); and Mucke, *Statistik der Lausitzer Wenden* (1886).

Wendt, Hans Hinrich, German theologian, was born in Hamburg, 18th June 1853, studied at Leipzig, Göttingen, and Tübingen, became *privatdocent* in theology at Göttingen (1877), and professor extra-ordinary (1881), and was called to a chair at Kiel in 1883, at Heidelberg in 1885. His books include *Die Begriffe Fleisch und Geist im biblischen Sprachgebrauch* (1878), *Die Christliche Lehre von der menschlichen Vollkommenheit* (1882), and *Die Lehre Jesu* (2 vols. 1886–90; Eng. trans. 1892—a book of unique importance), as well as the 5th to 7th editions of Meyer's Commentary on the Acts (1880–89).

Wener, Lake (*Vener*), the largest lake in the Scandinavian peninsula, and after the lakes Ladoga and Onega in Russia the largest in Europe, is situated in the south-west of Sweden, and separated by a comparatively narrow strip of land (nearly 20 miles wide) from the fiords of the Cattegat. It is nearly 100 miles in length, 50 miles in greatest breadth, and 300 feet in greatest depth, and lies 150 feet above sea-level; area, 2408 sq. m. From the north shore a peninsula extends southward into the middle of the lake; and from the southern shore a peninsula extends northward to within about 15 miles of the point of the northern peninsula; the portion of the lake lying to the west of these peninsulas receives the name of Dalbo Lake. Of the numerous rivers that feed the lake the chief is the Klar, from the north, and its surplus waters are discharged into the Cattegat by the river Göta. It is connected by a canal with Lake Wetter, by means of which and the Göta Canal, Lake Roxen, &c. inland communication is established between the Cattegat and the Baltic Sea. The lake is rich in fish; it is often visited by sudden gusts of wind, and is in many places too shallow for navigation. There are many islands.

Wenham Lake. See Ice.

Wenlock, a municipal borough of Shropshire, extending over more than 50 sq. m., and comprising Much Wenlock, Broseley (q.v.), Coalport, Madeley, Ironbridge, and Coalbrookdale (q.v.). It was incorporated by Edward IV. in 1448, and till 1885 returned two members to parliament. Much Wenlock, under the north-east end of Wenlock Edge, 12 miles SE. of Shrewsbury, has a quaint guild-hall (restored 1848), a market-hall (1879), a corn exchange (1852), a museum, and interesting remains of a Cluniac abbey, originally founded as a nunnery about 680 by Penda's granddaughter, St Milburga, and refounded in 1080 by Roger de Montgomery, Earl of Shrewsbury. Pop. of borough (1861) 19,699; (1891) 15,703—2180 in Much Wenlock registration district. For the Wenlock group in geology, see Silurian System.

Wens, or Sebaceous Cysts, are much more common on the scalp than in any other situation, though occasionally observed on the face, shoulders, &c., and consist of obstructed sebaceous glands, which enlarge by the internal pressure of their accumulated secretions. They are never of very large size; but several or many often occur in the same patient. The closed orifice may often be noticed in the form of a small dark depressed point, and in that case the duct may sometimes be gradually enlarged by the gentle introduction of a probe or director, and its contents pressed out. By this treatment wens may at all events be kept from being unsightly, and will sometimes shrivel up and disappear. If it fail, and the patient finds the tumour so annoying that he insists upon its removal, it must be exterminated with caustic or the knife. For the smaller cysts caustics may be employed. The most prominent part of the wen must be thoroughly cauterised with nitric acid or caustic potash, which will lead to the formation and separation of a slough; the tumour is thus laid open, and may either be left to empty itself and wither or may be emptied by pressure, and cauterised within. The larger cysts are readily removed by the knife; and under antiseptic precautions the operation is not dangerous.

Wensleydale Peerage. In 1856 Sir James Parke (1782–1868), a judge of the Court of Exchequer, was created a life-peer, in accordance with an ancient but, it was maintained, wholly obsolete usage. The resolution of the House of Lords, led by Lord Lyndhurst, not to receive the new baron, led to his being given a peerage of the usual kind (it died with him). There are, however, a number of official life-peers—the Lords of Appeal in Ordinary.

Wentletrap (*Scalaria*), a genus of Gasteropods related to the Turritellidæ. The elegant shell is spiral, with many whorls, the whorls deeply divided, and not always close together, crossed by remarkably elevated ribs, the aperture round and rather small. The colour is usually lustrous white. Scalaria is a predaceous Gasteropod, ranging from the shore to a depth of 100 fathoms. About 100 species of the genus are known. Those which have the whorls close together are called False Wentletraps by shell-collectors, those in which they are not contiguous are known as True Wentletraps. Of the former some are found in northern seas, as *Scalaria communis* on the coasts of Britain and of continental Europe, and *S. grœnlandica* on those of North America. The *true* wentletraps are all natives of the seas of warm climates. A species found in the south-east of Asia, and known as the Precious Wentletrap (*S. pretiosa*), was once in such esteem amongst shell-collectors that an extremely fine specimen is said to have been sold for 200 guineas; and an ordinary price was from three to five pounds. The shell may now be purchased for a few shillings.

Wentworth. See Strafford, Rockingham.

Werdau, a cloth-manufacturing town of Saxony, on the river Pleisse, 45 miles S. of Leipzig by rail. Pop. 14,665.

Werden, a town of Rhenish Prussia, on the Ruhr, 16 miles NE. of Düsseldorf by rail, with cloth manufactures. Pop. 7970.

Weregild, or Wergild, (A.S. *wer*, 'man,' and *geld*, 'satisfaction'), a composition by which, by the custom of Anglo-Saxons, Franks, and other Teutonic peoples, homicide and other heinous crimes against the person were expiated. There was an established progressive rate of weregild for homicide, varying at different times and among different Teutonic tribes, from the weregild of the

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ceorl or peasant to that of the king. In Anglo-Saxon times the value of the king was 7200 shillings; an ealdorman, 2400; a king's *thegn*, 1200; an ordinary territorial *thegn*, 600; a *ceorl*, 200. In the time of Tacitus the weregild for homicide among the Germans was due to the relatives of the deceased; that for other crimes one-half to the injured party and one-half to the state. The sum paid to the relatives in case of homicide, also known as the *man-wyrth*, seems to have been looked on as the equivalent of the dead man's value. As the power of the community or king increased, the exaction of retribution for the death of its members was considered to be the duty of the state as well as of the relatives, and the principle of division was applied to homicide as well as minor crimes; each payment being a separate full equivalent for the value of the deceased, the one to appease the fend, the other to make atonement to the state. This double weregild is recognised in the compensation for the death of a king by the laws of the Mercians and Northumbrians. In the days of Edward the Elder the weregild had become a much more complicated penalty, the composition for homicide consisting of four different payments, two of which, the *fight-wite*, or penalty for a breach of the peace, and the *weregild*, went to the king as head of the state; while a sum called the *halsfang* was paid to the kindred to stay the hand of the avenger of blood, and the *manbote* was given to the overlord to compensate him for the loss of a vassal. The graduated scales of weregild in use among the different Teutonic nations throw much light on the gradations of society at the period. It does not appear that among the nations who recognised the principle of weregild the relatives were bound to accept a compensation for their kinsman's slaughter, in place of appeasing the death-feud by blood; the latter practice was often resorted to instead. It was only through the exertions of Archbishop Theodore that Egfred, the Christian king of the Angles of Northumbria, adopted the alternative of accepting a weregild for his brother slain in battle by the Mercians, in place of demanding the blood of the slayer. See VENDETTA.

Werewolf (A.S. *were-wulf—wer*, 'a man,' *wulf*, 'a wolf.' The modern Ger. *Währwolf* is the Middle High German *Werwolf*, Latinised as *garulphus* or *gerulphus*, whence the Old Fr. *garoul*, the modern name being pleonastically *loup-garou*). Halliwell quotes from a Bodleian MS. (*Dict. Archaic and Provincial Words*, s.v. 'a-charmed') a characteristic example of 'Folk-etymology:' 'Ther ben somme that eten chyldren and men, and eteth noon other flesh fro that tyme that thei be a-charmed with mannys flesh, for rather thei wolde be deed; *and thei be cleped werewolfes for men shulde be war of hem.*' The following passages from Gervase of Tilbury's *Otia Imperialia* and Richard Verstegan's *Restitution of Decayed Intelligence* (1605) give a summary of belief about the werewolf, one of the most uncanny of the creatures of human imagination. 'Vidimus enim frequenter in Anglia per lunationes homines in lupos mutari, quod hominum genus *gerulphos* Galli nominant, Angli vero *were-vulf* dicunt.' 'The were-wolves are certain sorcerers, who having anointed their bodies with an ointment which they make by the instinct of the devil, and putting on a certain enchanted girdle, do not only unto the view of others seem as wolves, but to their own thinking have both the shape and nature of wolves, so long as they wear the said girdle; and they do dispose themselves as very wolves, in worrying and killing, and most of human creatures.' This superstition was widely spread in ancient and mediæval times, and is still a living fact amongst many savage races, and even in corners of France, not to speak of Russia and Bulgaria. Wlislocki, writing in 1891 (*Journal Gypsy Soc.*), tells us of a gypsy fiddler's wife at Tórész in north Hungary, about ten years before, who kept the family in mutton and enabled her husband to start a thriving inn by her nocturnal ravages as a *ruvanush*. The parson cured the woman by sprinkling her and the house with holy water; the peasants murdered the husband, and two of his slayers were then living in the village. Indeed we may say it is a commonplace of folklore that certain men by natural gift, or magic art, can turn for a time into ravening beasts, which Dr Tylor calls 'substantially a temporary metempsychosis or metamorphosis.' And Thomas Aquinas lends the weight of his grave authority to a sound theological explanation: 'All angels, good and bad, have by natural virtue the power of transmuting our bodies.' In various forms of mental disease there is a belief in a similar transformation, but this no doubt presupposes an antecedent sane belief in the possibility of such metamorphoses into animals. These insane delusions have been widely prevalent at various times in the history of human society, and have given rise to the name of *Lycanthropy*. The wolf is of course not the only animal, although the most common in western Europe. But in England he has long been unknown, and the cat has had to be largely employed in witch transformations. Herodotus tells us the Neuri turned to wolves for a few days every year. The Khonds of Orissa think some men have the art of 'mleepa,' and by the help of a god become mleepa tigers to kill their enemies, one of the man's four souls going out to animate the beast. The tribe of Budas again in Abyssinia, ironworkers and potters, have also the evil eye and the power of turning into hyænas, whence they are very properly denied the Christian sacrament. In Virgil's 8th Eclogue we read how Mœris makes himself a wolf by means of poisonous herbs, and how he witches away the crops and calls up dead folk from their graves. Petronius Arbiter has a story of the transformation of a *versipellis* or *turnskin*, and here also we find the note so familiar in European stories of werewolves and witches, of how when the wolf is wounded the man who wore his shape is found to bear exactly the same wound. We find werewolf warriors of peculiar ferocity in Scandinavian sagas, and to this day in Denmark a man who is a werewolf is recognised by his eyebrows meeting as if his soul were ready to take flight like a butterfly. The change of shape is often effected by taking off the clothes, putting on a girdle, or rubbing with magic salve. 'Wolf-girdles' are still spoken of at least in Germany, and in December, as Tylor notes, one must not 'talk of the wolf' by name lest the werewolves rend you. During the 16th century France was much infested with werewolves, the trial of Gilles Garnier at Dôle in 1573 being the most famous historical instance; and Olaus Magnus in the same period tells of specially accursed werewolves who were ferocious against the orthodox. But on the other hand we meet a more kindly view in the Bisclaveret of Marie de France's *lai*, and in the romance of *William and the Werewolf*—more in keeping with the usual folklore notion of interchangeable transformation and mutual relationship between the human and the animal world.

It is obvious that in all this there is a close connection with the obscure facts underlying Totemism. And, as we have seen, Dr Tylor connects it also with metempsychosis, and both at least agree in a common basis of animism. The mythological explanation (λύκος, 'wolf,' for λευκός, 'shining') is of course inadmissible, for the transformations were not confined to beasts with

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shining coats. Equally inadmissible is the rationalistic explanation of an innate thirst for blood in some natures breaking out occasionally, together with hallucinations, into cannibalism, the chief victims being peasants whose chief terror was wolves. For the idea of such transformations must already have been familiar and common, rather than exceptional, and thus a belief in these necessarily presupposes a belief in lycanthropy.

The Rev. S. Baring-Gould's *Book of Were-wolves* (1865) contains good examples, but its theories may be neglected. The best account is Dr Wilhelm Hertz's monograph, *Der Werwolf* (1862). See also Richard Andree in *Ethnographische Parallelen und Vergleiche* (1878), and Dr E. B. Tylor's *Primitive Culture;* also the articles TOTEMISM, VAMPIRE, and WITCHCRAFT.

Wergeland, HENRIK. See NORWAY, p. 533.

Werner, ABRAHAM GOTTLOB, mineralogist and geologist (1750–1817). See GEOLOGY, p. 148.

Werner, E., pseudonym of Elisabeth Bürstenbinder, a novelist who, born in Berlin in 1838, attained eminence as a writer of novels and stories, of which *Sacred Vows, Fickle Fortune, Riven Bonds,* &c. have been translated into English.

Werner, FRIEDRICH LUDWIG ZACHARIAS, dramatist, was born at Königsberg, 18th November 1768, studied at the university there, and in 1793–1805 was in the Prussian civil service. As author of a series of dramas he became founder of a side branch of the Romantic school, that of the mysterious and extravagant 'fate-tragedies.' He was thrice married and thrice separated by divorce, entered the Catholic Church at Rome in 1811, and died a priest at Vienna, 17th January 1823. His chief works are *Die Söhne der Thals* (1803), *Das Kreuz an der Ostsee* (1804), and *Martin Luther* (1806). See the long essay in Carlyle's *Miscellanies.* There are biographies by Hitzig (1823), Schülz (1841), and Düntzer (1873).

Wernigerode, a town of Prussia, at the northern foot of the Harz Mountains, 50 miles SW. of Magdeburg, with an old castle and a pop. of 9085.

Werther. See GOETHE.

Wesel, a strongly fortified town of Prussia, at the confluence of the Lippe with the Rhine, 35 miles NW. of Düsseldorf by rail. Cloth, pottery, machinery, &c. are manufactured. Pop. (1890) 20,736.

Weser, a river of Germany, formed at Münden out of the Werra and the Fulda; hence it flows north through Prussia, till, passing Bremen, it forms for about 40 miles the boundary between Oldenburg and Prussia, and enters the North Sea by a wide but shallow estuary, after a course of 280 miles. It communicates with the Elbe by a canal.

Wesley, JOHN, was born on June 17 (o.s.), 1703, in Epworth Rectory, his father being the rector of that little Lincolnshire market-town. He was descended from a long line of English gentry and clergy; the Duke of Wellington (q.v.) belonged to a collateral branch of the same family. On the maternal side he was related to the more cultured and refined representatives of English Nonconformity, his mother's father being Dr Samuel Annesley, 'the St Paul of the Nonconformists.' In 1714 John Wesley was nominated on the foundation of Charterhouse School by the Duke of Buckingham. In 1720 he was elected to Christ Church, Oxford, of which House his brothers Samuel and Charles were also members. Wesley soon began to display an extraordinary conscientiousness and an ascetic tendency; Thomas à Kempis and Jeremy Taylor had much influence over him. He finally resolved to enter the church, and was ordained deacon in Christ Church Cathedral in 1725, and admitted to priest's orders in the same place in 1728. In 1726 he was unanimously elected fellow of Lincoln College, and in the same year he was chosen Greek lecturer and moderator of the classes. In 1727 he left Oxford to assist his father, but returned in 1729, becoming a zealous tutor. During his absence his brother Charles and two or three other young men began to attract special attention by what was at that time regarded as a quite fanatical religious earnestness. A young gentleman of Christ Church, struck by the exact regularity of their lives and studies, exclaimed, 'Here is a new sect of Methodists sprung up.' Many years after, Wesley defined Methodist as a man who arranges his life according to 'the method laid down in the New Testament.' The two Wesleys, James Hervey, and George Whitefield were the most distinguished of the Oxford Methodists. In 1732 Wesley formed the personal acquaintance of William Law, and was for a time much influenced by mystical theology. In 1735 Wesley's father died, and in the same year Wesley undertook a mission to Georgia under the direction of the Society for the Propagation of the Gospel. At that time Wesley was a High Churchman of the most rigid type. He had two daily services. He divided morning prayer, taking the Litany as a separate office. He inculcated severe fasting and confession before communion. He made a point of celebrating the holy communion weekly. He even refused the holy communion to all who were not episcopally baptised. He insisted upon baptism by immersion. He rebaptised the children of Dissenters. He refused to bury all who had not received Episcopalian baptism. At this moment in his career he seemed to be on the point of anticipating the work of Cardinal Newman by a century. But events were about to happen which would take him ultimately to the opposite pole of the ecclesiastical world. On his voyage to Georgia he had been greatly impressed by the perfect fearlessness of the Moravians when in momentary danger of shipwreck. His irritating ecclesiastical intolerance, and an unfortunate love-affair, produced strife and misunderstanding, and he returned to England in 1738. In London he met the Moravian missionary, Peter Böhler, and after much prayerful intercourse with him, was convinced that Christian faith was not an intellectual acceptance of orthodox opinions, but a vital act, and afterwards a habit of soul by which man, under the supernatural impulse of the Spirit of God, trusts in Christ, enters into living union with Christ, and then abides in Christ, so that he no longer lives, but Christ lives in him, as the vine lives in the branch, and as the controlling mind lives in the body. Then came the ever memorable 24th of May 1738, when Methodism as history knows it was born. The decisive moment is described in his *Journal:*

'In the evening I went very unwillingly to a society in Aldersgate Street, where one was reading Luther's preface to the Epistle to the Romans. About a quarter before nine, while he was describing the change which God works in the heart through faith in Christ, I felt my heart strangely warmed. I felt I did trust in Christ, Christ alone, for salvation, and an assurance was given me that He had taken away *my* sins, even *mine,* and saved *me* from the law of sin and death. I began to pray with all my might for those who had in a more especial manner despitefully used me and persecuted me. I then testified openly to all there what I now first felt.'

The Rubicon was crossed. The sweeping aside of ecclesiastical traditions, the rejection of Apostolical Succession, the ordination with his own hands of presbyters and bishops, the final organisation of a separate and fully-equipped church, were all logically involved in what took place that night. It is difficult for us to realise now the heathen condition of England at that time; no language can describe the degradation of the masses of the people. The clergy unwittingly rendered a great

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service by closing their pulpits against Wesley; their intolerance, the example of Whitefield, and the needs of men drove him into the open air. He made the great innovation first at Bristol, where he preached to 3000 persons. England has never seen anything like his open-air work. During his itinerary of half a century 10,000, 20,000, and even 30,000 people would come together and wait patiently for hours until the great evangelist appeared on horseback upon the scene. He bestowed little labour either upon fashionable localities or upon sparsely populated agricultural districts. He gave his time and strength to neighbourhoods where the working-class abounded; hence the mass of his converts were colliers, miners, foundrymen, weavers, spinners, fishermen, artisans, yeomen, and day-labourers in towns. He never journeyed less than 4500 miles in one year; he always rose at four and preached at five, as well as two or even three times later. Until his seventieth year all his journeys were done on horseback, and he rode sixty or seventy miles day after day, as well as preached several times. Terrible persecutions broke out, and his life was frequently in danger; but he completely outlived all persecution, and the itineraries of his old age were triumphal processions from one end of the country to the other. During the fifty years of his unparalleled apostolate he travelled 250,000 miles and preached 40,000 sermons. Yet he managed to do a prodigious amount of literary work.

He wrote short grammars in the English, French, Latin, Greek, and Hebrew languages; a Compendium of Logic; extracts, for use in Kingswood School and elsewhere, from Phædrus, Ovid, Virgil, Horace, Juvenal, Persius, Martial, and Sallust; a complete English Dictionary; commentaries on the whole of the Old and New Testaments; a short Roman History; a History of England from the earliest times to the death of George II.; a concise Ecclesiastical History, from the birth of Christ to the beginning of the last century, in 4 vols.; a Compendium of Social Philosophy, in 5 vols.; a Christian Library, consisting of extracts from all the great theological writers of the universal church. This library of 50 vols. was prepared especially for the benefit of his itinerant preachers, and consisted of representatives of all the leading writers, ancient, mediæval, Puritan, and modern. In addition to this he prepared many editions of the *Imitation of Christ*, and of the principal works of such writers as Bunyan, Baxter, Principal Edwards, Rutherford, Law, Madame Guyon, and others; endless abridged biographies; and, singularly enough, an abridged edition of a famous novel of the time, Brooke's *Fool of Quality, or The History of Henry, Earl of Moreland*. He also wrote a curious book, which he entitled *Primitive Physic, or an Easy and Natural Method of Curing most Diseases*. He further prepared numerous collections of psalms, hymns, and sacred songs, with several works on music and collections of tunes. In addition, he published his own *Sermons* and *Journals*, and started in 1778 a monthly magazine which still exists. His works were so popular that, to use his own language, he 'unawares became rich.' He made not less than £30,000, every penny of which he distributed in charity during his life.

In addition to his literary and evangelistic work Wesley was a great philanthropist. He founded an orphans' home at Newcastle, charity schools in London, and a dispensary in Bristol. One of the most curious delusions that has ever persisted in Christendom is the notion that he continued to be theologically or ecclesiastically a High Churchman. There is much more ground in his later career for the contention of Dean Stanley that he was the founder of the Broad Church. Under his direction the Conference in 1770 adopted resolutions which produced an outburst of furious indignation on the part of his orthodox Calvinistic friends. These resolutions stated explicitly that the heathen who had never heard of Christ could be saved if they feared God and worked righteousness according to the light they had. On another occasion he wrote in his *Journal* that he had been reading the meditations of Marcus Aurelius, and that he was no doubt one of the 'many' who would 'come from the east and the west and sit down with Abraham, Isaac, and Jacob' in the kingdom of God, while nominal Christians were 'shut out.' He spoke in the strongest terms of the 'execrable wretches' who wrangled at the various church councils, and actually added: 'Surely Mohammedanism was let loose to reform the Christians! I know not but Constantinople has gained by the change.' On the other hand, he spoke of Ignatius Loyola as one of the greatest of men. As early as 1745 he expressed the conviction that bishops and presbyters are essentially one order, and that originally every Christian congregation was a church independent of all others. From this conviction he never departed. When in 1784 he ordained presbyters and a bishop for America, his brother Charles, who did retain High Church convictions, wrote the most earnest expostulations. To these John Wesley replied in the following sentences: 'I firmly believe I am a scriptural *ἐπίσκοπος* as much as any man in England or in Europe; for the uninterrupted succession I know to be a fable, which no man ever did or can prove.' In harmony with these convictions he himself ordained ministers for Scotland, for the colonies, and ultimately for England. No doubt he greatly loved the church in which he was born, and deeply deplored the providential circumstances which compelled him to vary more and more from her doctrines and practices. He took upon himself with the utmost reluctance the responsibility of organising a separate church. But the most striking feature of his life as a theologian was his readiness in the last resort, whatever it cost him, to adapt his creed to indisputable facts. He was the first great religious leader in modern times who heartily accepted the Baconian principle of verification in the region of theology. He was essentially a scientific theologian. The keynote of his career is found in the characteristic exclamation, 'Church or no church, the people must be saved.'

Wesley died on March 2, 1791, in the eighty-eighth year of his age. Almost his last words were 'the best of all is, God is with us.' The organisation, doctrine, and present condition of the societies founded by him will be found at METHODISTS.

See the Life by Tyerman (1870; new ed. 1876), and those by Southey (1820; new ed. 1889), Miss Wedgwood (1870), Urlin (1870), Rigg (1875), Telford (1886), Overton (1891), Kirton, Bevan, and others. There are Lives of Charles Wesley by Jackson (1841–49) and Telford (1886); of Samuel Wesley, the elder brother, by Tyerman (3 vols. 1866); of their mother, by Kirk (1866) and Clark (1886); and of the Wesley family, by Stevenson (1876).

WESLEY, CHARLES, his brother, was born at Epworth, December 18, 1707, had his education at Westminster and Christ Church, Oxford, became one of the Oxford Methodists, 'found rest to his soul' on Whitsunday 1737, and was throughout life indefatigable lieutenant to his greater brother, especially in Bristol and London. He died in London, March 29, 1788. He is said to have written 6500 hymns. The number of books of poetry published by the brothers, in conjunction or separately, 1738–86, was sixty-three. It is usual to ascribe all the translations from the German to John, the original hymns to Charles, except such as are traceable to John through his *Journals* and other works. The *Poetical Works* of the pair, officially edited for the Wesleyan Methodist Conference, fills thirteen volumes (1868–72). Many of Charles Wesley's hymns are exquisite poetry as well as devotion. It is enough to name 'Jesu, Lover of my Soul,' and 'O for a thousand tongues to sing.'

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Wessel, JOHANN (also known as *Gansfort*), a reformer before the Reformation (1420–89), was born at Groningen, educated amongst the Brethren of the Common Life, and taught philosophy at Cologne, Louvain, Heidelberg, and Paris. A humanist by training, he based his theology on the Bible directly, and was revered by his disciples as *Lux Mundi*. See monographs by Ullmann (embodied in *Reformatoren vor der Reformation*, 1866), Friedrich (1862), Dödes (in *Studien u. Kritiken*, 1870).

Wessex. In 514 a swarm of Saxons, called *Gewissas*, landed on the shores of Southampton Water, and were soon reinforced by a band of Jutes, with whom they coalesced under their king, Cerdic (519–34), becoming known as the West Saxons. They quickly overran the modern Hampshire, and Wight, and the next king, Cynric (534–60), seized Salisbury Plain, and forced his way to the Thames, only to find his progress eastward barred by the Middle Saxons. Ceawlin (560–92) pushed back the Jutes of Kent, then turned northwards, seizing the valleys of the Thame and Cherwell, next the Severn, and in 583 destroyed the old Roman station of Uriconium. But farther progress northwards was checked by the defeat at Faddiley and by long internal dissensions. Next Mercia took their possessions north of the Thames and the Somersetshire Avon. In 635 Wessex accepted Christianity, next under Cenwealh (643–72) it extended its western border from the Axe to the Parret, under Ine (688–726) beyond the Parret, and under Cuthred (741–54) it threw off the Mercian yoke. Offa in 779 again pushed them to the Thames, but they now turned westwards and made themselves masters of Devon. From this time their influence constantly grew until in Egbert, under whom they reached to the Tamar, they rose to the lordship of the other kingdoms and states, and began the history of England. See EGBERT, and ENGLAND.

West, BENJAMIN, painter, was born at Springfield, Pennsylvania, 10th October 1738, of Quaker parentage, and, though lacking all encouragement, surprised his friends by his skill in drawing at the age of seven years, and at nine painted a picture in water-colours, which in after life he declared he had in some respects never surpassed. His first colours were made from leaves, berries, &c., and his brushes hairs stolen from a cat's tail. Thus self-taught, at the age of sixteen he practised portrait-painting in the villages near Philadelphia, and painted for a gunsmith his first historical picture, 'The Death of Socrates.' At eighteen he was painting portraits in Philadelphia, and later at New York, where in 1760 he was aided by some generous merchants to go and pursue his studies in Italy. At Rome he was patronised by Lord Grantham, whose portrait he painted, became the friend of Raphael Mengs, and as the first American artist ever seen in Italy attracted much attention. He painted his 'Cimon and Iphigenia' and 'Angelica and Medora,' and was elected member of the Academies of Florence, Bologna, and Parma. In 1763, visiting England on his way to America, he was induced to remain in London, and in 1765 married Eliza Shewell, to whom he had been engaged before leaving America. His 'Agrippina landing with the ashes of Germanicus' attracted the attention of George III., who was his steady friend and patron for forty years, during which time he sketched or painted 400 pictures. His 'Death of General Wolfe,' painted in the costume of the period, against the advice of all the most distinguished painters, effected a revolution in the historic art of Britain. For the king he painted a series of 28 religious pictures for Windsor Castle. Among his best-known works are 'Edward III. at Cressy,' 'The Black Prince at Poictiers,' 'Queen Philippa at Calais,' 'Penn's Treaty with the Indians,' 'Christ healing the Sick,' 'Death on the Pale Horse,' and the 'Battle of La Hogue.' In 1792 he succeeded Sir Joshua Reynolds as the President of the Royal Academy, but declined the honour of knighthood. He attained very great contemporary fame, his drawing being correct and his composition skilful, though the colouring is a monotonous and dull reddish brown. Through his whole career he was the generous friend, adviser, and patron of young artists. He died in London, March 11, 1820, and was buried with great pomp at St Paul's Cathedral. His wife died 1817. Two sons survived him.

There is a Life of him (not good) by John Galt (1820), and another in Allan Cunningham's *Lives;* the best authorities are Dunlap's *History of Arts in the United States* (New York, 1834), C. E. Lester's *Artists of America* (1846), and H. T. Tuckerman's *Book of the Artists* (1867).

West Australia. See WESTERN AUSTRALIA.

West Bay City, a town of Michigan, on the Saginaw River, opposite Bay City, with a very large trade in lumber, &c. Pop. (1880) 6397; (1890) 12,981.

Westborough, a small manufacturing town of Massachusetts, 32 miles by rail W. by S. of Boston, with a state reform school. Pop. 5229.

West Bromwich, a parliamentary, municipal, and county borough of Staffordshire, one of the most important towns in the great manufacturing and mining district known as the 'Black Country.' It is 5¼ miles NW. of Birmingham, 90 SSE. of Liverpool, 93 NNE. of Bristol, and 113 NW. of London. The *Bromwic* of Domesday, and the seat in the 12th century of a Benedictine priory, it yet is of modern growth, having risen within the last hundred years from a mere village on a barren heath, in consequence mainly of the rich coal and iron mines in the vicinity, of the industries to which these give rise, and of the transport facilities by rail and canal. The public buildings, erected in 1875 at a cost of £30,000, comprise a town-hall with a fine organ, a tower 130 feet high, a market-hall, free library, public baths, &c. There are also the institute (1886), All Saints Church (rebuilt 1872), Christ Church (1829), with a tower 114 feet high and twelve bells, the West Bromwich district hospital (1867–82), and a public park of 65½ acres, with a boating and bathing pool, and commanding a beautiful view. The last was presented to the town in 1878–87 by the Earl of Dartmouth, whose ancestor purchased the manor in 1823, it having previously been held by Stanleys, Clarke-Jervoises, &c. The manufactures comprise all departments of Birmingham hardware, as gun-barrels, axle-boxes, locks, swords, bayonets, fire-irons, fenders, saucepans, safes, cooking-ranges, gas-stoves, &c. Puddling and sheet-iron rolling, sheet-glass making, coal-mining, and brick and tile making are also carried on to a great extent. By the Reform Act of 1867 West Bromwich was included within the parliamentary borough of Wednesbury, but since 1885 it has returned a member by itself. It was made a municipal borough in 1882 and a county borough in 1888. Pop. (1801) 5687; (1841) 26,121; (1881) 56,295; (1891) 59,489. See Joseph Reeves's *History of West Bromwich* (1836).

Westbury, a little market-town of Wiltshire, 16½ miles SSE. of Bath and 25 NW. of Salisbury. Returning till 1832 two members to parliament, and then till 1885 one, it has lost its clothing industry, but has iron-smelting works. The fine church has memories of Walter Map and Mackonochie. Westbury White Horse, cut out on the southern slope of Westbury Down (775 feet), is 175

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feet long, and was restored in 1778 and 1853. It probably commemorates Alfred the Great's victory of Ethandún (Edington) over the Danes in 878 (see WHITE HORSE). Pop of parish, 5613.

Westbury, RICHARD BETHELL, BARON, was born at Bradford-on-Avon, the son of a Bristol physician, June 30, 1800. He had his schooling at Corsham, near Bath, and at Bristol, at fourteen entered Wadham College, Oxford, and was just eighteen when he graduated with a first-class in classics and a second in mathematics. Soon after he was elected to a fellowship in his college, and in 1823 he was called to the bar at the Middle Temple. His industry, acuteness, and audacity quickly brought him a large practice, and made him by 1841 the leader of the Chancery bar with an annual income of over £20,000. He became Q.C. in 1840, was returned as an advanced Liberal for Aylesbury in 1851, for Wolverhampton at the general election of 1852. Already in 1851 Vice-chancellor of the duchy of Lancaster, he became Solicitor-general in 1852, Attorney-general in 1856, and in 1861 succeeded Lord Campbell on the woolsack, taking his title from Westbury in Wiltshire. In the House of Commons he had borne the burden of several important measures of law reform—the Succession Duty Bill, the Probate and Administration Bill (1857), the Divorce and Matrimonial Bill, the Fraudulent Trustees Bill, and the Bankruptcy and Insolvency Bill (1861). His ideas about legal education were too comprehensive for his contemporaries, but induced the various Inns of Court to consolidate their rules. Unsuccessful also were his schemes for revising and codifying the statutes, and for putting an end to the separation between law and equity—a consummation effected by Lord Selborne which Westbury died a fortnight too soon to see. He delivered the judgment of the judicial committee of the Privy-council on the appeals in the 'Essays and Reviews' cases, and in the debate in the House of Lords employed the unwonted artillery of raillery and irony against Wilberforce and the whole bench of bishops. In 1865 Westbury was compelled to resign office through the clamour against some official appointments, but the chancellor was personally acquitted of unworthy motives. He opposed Gladstone's Irish Church Bill, and still more the Irish Land Act of 1870, and gave the last year of his life to arduous labour as arbitrator of the European Assurance Society. He died in London, July 20, 1873. Lord Westbury's acuteness of intellect was indeed great, but did not justify his merciless use of the weapon of sarcasm, and that of the bitterest. But he has had his reward. Though a zealous reformer and great lawyer, with a rare faculty of piercing quickly to the heart of his subject, he is already remembered only by a few stories and sayings, and these not all authentic. See his Life by T. A. Nash (2 vols. 1888).

West Calder, a mining-town of Midlothian, 16 miles WSW. of Edinburgh. Pop. 2516.

West Chester, capital of Chester county, Pennsylvania, 27 miles by rail W. of Philadelphia, with a normal school and the law department of Lincoln University, and foundries, machine-shops, and manufactories of flour, hosiery, soap, and tinware. Pop. 8028.

Westcott, BROOKE FOSS, a great New Testament scholar, was born near Birmingham in 1825, and, like Lightfoot, Hatch, and Benson, had his schooling under Prince Lee at King Edward's School, Birmingham, whence he passed to Trinity College, Cambridge. He carried off the Battie university scholarship, the medal for the Greek ode twice, the Bachelor's prize for the Latin essay twice, the Norrisian prize (1850), and in 1848 was bracketed first classic. Elected fellow of his college in 1849, he took orders in 1851, and was an assistant-master at Harrow from 1852 till 1869, when he became a canon of Peterborough. He was appointed regius professor of Divinity at Cambridge in 1870, chaplain-in-ordinary to the Queen in 1879, canon of Westminster in 1883, and in 1890 succeeded his dear friend Lightfoot in the bishopric of Durham. The D.D. of his own university (1870) was followed by the Oxford D.C.L. in 1881, and the Edinburgh D.D. at her tercentenary in 1883. He was one of the company for the revision of the Authorised Version of the New Testament, and his views are known to have had the greatest influence in the deliberations. His edition of *The New Testament in Greek* was published in 1881, the result, conjointly with Dr Hort, of the labours of twenty-eight years. The first volume contained the text, the second the introduction. Manuals of the greatest value, no less for their learning than their clearness of style, are *General Survey of the History of the New Testament Canon* (1855) and *An Introduction to the Study of the Gospels* (1860). No less admirable summaries of knowledge are *The Bible in the Church* (1864) and *A General View of the History of the English Bible* (1868). His commentaries are upon the Gospel of St John (*Speaker's Commentary*, 1882), the Epistles of St John (1883), and the Epistle to the Hebrews (1889).

Besides these Dr Westcott has published several volumes of strong and eloquent sermons: *Characteristics of the Gospel Miracles* (1859), *The Gospel of the Resurrection* (1866), *The Christian Life Manifold and One* (1869), *Steps in the Christian Life* (1880), *The Revelation of the Risen Lord* (1881), *The Historic Faith*, on Apostles' Creed (1883), *The Revelation of the Father* (1884), *Christus Consummator* (1887), *Social Aspects of Christianity* (1887), *The Victory of the Cross* (1888). Other books are *On Some Points in the Religious Office of the Universities* (1873), *The Paragraph Psalter* (1879), *Some Thoughts from the Ordinal* (1884), and *Essays in the History of Religious Thought in the West* (1891).

Westerly, a village of Rhode Island, on the Pawcatuck River, 44 miles by rail SSW. of Providence, with flannel and cotton mills. The township contains noted granite-quarries. Pop. 6813.

Western Australia embraces the western third of Australia. The Indian Ocean is to the north and west, the Southern Ocean to the south, South Australia, with its Northern Territory, to the east. It extends from 13° to 35° S. lat. and 113° to 129° E. long., being 1500 miles long by 1000 broad. The area is 1,060,000 sq. m., or 678,400,000 acres—i.e. nearly twenty times the size of England. While the central portions are stony or sandy, with the north and south coasts poor in soil, there is good land at the west and in the north-east. Less hilly than eastern Australia, it is not so well watered. The Darling Range, 300 miles in length, has few peaks of 3000 feet; Koikyeunerup, north of King George's Sound, is 3500 feet; and the King Leopold Mountains are north-east. Few rivers run in the dry season; the Swan, Blackwood, Murchison, Irwin, Gascoyne, and Greenough are in the south-west, Fortescue, Ashburton, and De Grey north-west, Fitzroy and Glenelg north-east. Several shallow salt lakes are inland. The chief islands are Rottnest, near the Swan River; Dirk Hartog, off Shark's Bay; the Abrolhos Guano Isles, west; Dampier Archipelago, north-west; Buccaneer Archipelago, north-east; Nuyt's Archipelago, south-east. Besides the south-western counties, there are the western Gascoyne division, the north-west division, the eastern division, the north-eastern Kimberley division, and the southern Eucla division. Perth, the capital, has Fremantle for its port. Albany, on King George's Sound, is south-east of Perth; Bunbury, south-west; Geraldton,

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Guildford, and Northampton are north; York, Northam, and Beverley, east. Carnarvon is the Shark's Bay port of the Gascoyne. Roebourne and Cossack are east of North-west Cape. Broome, Derby, and Wyndham are in the north-east division. Eucla port is in the extreme south-east.

The climate is, from its dryness, brightness, and freedom from miasma, much admired, though the north and north-west are less comfortable than the south-west, from excessive heat. The tropical interior has considerable cold on winter nights. Perth, during a year, varied from 38° to 106° in the shade; Cossack, 50° to 115°; Albany, 40° to 80°. The wet season south of Shark's Bay is in winter; north of it, in summer, or December to April. Cyclones often mark the changes. The average annual rainfall in Perth is 33 inches. In the wet year 1890, however, it was 47; Bunbury, 53; Cossack, 8. The trade-winds bring little rain to the northern coast.

In the geology two features are prominent, granite and recent limestone. The first prevails about King George's Sound, the north-west and north-east ranges, and in many parts of the desert interior. Palæozoic rocks crop out in the mountains; they are chiefly Silurian, and are much metamorphosed in the mining districts. The table-lands of Kimberley and about the Ashburton are of Devonian age. Carboniferous country is recognised by Stigmaria and Lepidodendron, though there are coal-measures of Mesozoic type, and non-caking coal of good quality is being dug between Bunbury and Albany. Workable beds exist on the Collie, Murchison, Gascoyne, and Irwin rivers. Tablelands, so common inland, are of sandstone, one kind older than the other. The flat-topped hills of the north are not conformable with the Carboniferous sandstones beneath. The desert sandstone, disintegrating, is the source of the red, shifting sand-dunes. Coralline limestone Tertiary formations abound around the coast. The limestone beneath the desert sandstone is rich in springs. Mesozoic fossils are Oolitic, Jurassic, and Lias; the Tertiary comprise the huge quadrupeds Dinotherium and Nototherium. Volcanic rocks are not uncommon, and Plutonic ones permeate the more ancient sedimentary strata.

Spaniards and Portuguese had the western and northern coasts in their maps about 1530. The Dutch re-discovered these parts. Dirk Hartog, in the ship *Eendracht*, was at Shark's Bay in 1616; Edel, north, 1619; De Witt, 1628; the ship *Leeuwin* or Lioness, 1622; the *Gulde Zeepard*, at the Swan and Nuytsland, 1627. Vlaming of the *Geelvinck* brought the black swan to Europe. Tasman sailed along the north in 1644. Dampier was there in 1688 and 1696; Vancouver, at the Sound, 1791; D'Entrecasteaux, 1792; Baudin, of the *Géographe* and *Naturaliste*, 1801; Flinders, 1801; King, 1820–22; the *Beagle* survey later. Captain Grey explored in 1838; Eyre, 1841; followed by Roe, Austin, A. and F. Gregory, John and A. Forrest, Warburton, &c. A temporary settlement was made from Sydney, at the Sound, in 1825. A private association in 1828 obtained land, on certain conditions, from the government, and established themselves at the Swan in 1829. Upon their failure arose the crown-colony of Western Australia. Transportation hither ceased in 1867. After some difficulty, the settlers obtained their new constitution in 1890. Since October 1890 there has been responsible rule and a liberal franchise. The revenue for 1891 was £497,670; expenditure, £435,622. The public debt was a million and three-quarters. The population at end of 1891 was 53,285 —21,057 being females.

The natural history is not unlike that of the rest of Australia, though some quadrupeds are peculiar, as the peragalea or native rabbit. The Moloch (q.v.) or mountain devil is an insect-feeding lizard. Alligators and turtles are found northward. The tarsipes is a peculiar honey-eating bird. The sea-mullet is preserved. Pearl-oyster beds are better off Cossack than at Shark's Bay. Trepang (q.v.), or bêche-de-mer, furnishes an export.

Baron von Mueller calls Western Australia the *floral land*. Timber of excellent quality abounds to the south-west, towards Cape Leeuwin. The jarrah, or mahogany, is the *Eucalyptus marginata*, which withstands white ants and ship-worms. The karri, or *E. diversicolor*, may be 100 feet to the first branch. The wandoo and tuart are hard white gums. York gums favour poor soil. The red gum, *E. calophylla*, yields much gum. The *E. ficifolia* displays a mass of crimson flowers. There are 150 acacias, of which the raspberry gum-tree is one. Sandalwood grows from Shark's Bay to the Bight. Poison plants may sometimes kill stock. The colony's vegetation is of the oldest type in Australia, and of far higher antiquity than that of Europe.

State aid is given to both schools and churches. The system in government schools is secular; in assisted schools, denominational. Higher education is aided by the state. While the average attendance at Church of England worship was 4820, it was 3880 at Roman Catholic, 3920 at Wesleyan, 1500 elsewhere.

There are six pastoral districts in the colony. The desert has some good oases. Pasturage land is leased by the government. Of 130,000 acres in crop, wheat and other cereals do well. The gardens have twenty-five sorts of fruits, grapes being fine and abundant. Land is sold in ten annual payments of 1s. per acre, subject to conditions of improvement. But the western portion only has moisture enough for ordinary husbandry.

Geraldine, in the Victoria district, had lead and copper mines in 1842. Gold has been but recently found, and first on the Irwin. In 1887 auriferous reefs were worked at Yilgarn, east of the Darling Range, and the area is 100 miles north to south. The Ashburton field is 150 miles long. The Pilbarra gold-field includes 30,000 sq. m. At Roebourne, Kimberley, and the Murchison gold is obtained. The Greenbushes yield tin. Mining leases of from 20 to 200 acres are at 5s. per acre for seven years. A coal lease may be 640 acres, at 6d. per acre, and a royalty of 3d. per ton.

Merchants have difficulties from sparse population and want of communication. The imports for 1891 were £1,163,000, though ten years before but £404,831. The exports were £765,450. These consisted of wool, skins, timber, pearls, mother-of-pearl, gold, lead, and copper, sandalwood and eucalyptus oils, fruits, guano, dried fish, &c. Besides specific duties on goods, there are *ad valorem* duties of 5, 12½, and 20 per cent. Railways are now progressing, by the principle of land grants to private companies, which in 1892 had 400 miles open and 200 preparing. The government lines opened at the end of 1891 were 206 miles, with 300 more in progress.

See Nicolay's Handbook; *Western Australian Year-book;* Mennell's *Coming Colony;* E. Giles, *Australia Twice Traversed* (1889); *Western Australia*, by the present writer; *Albany Guide*, &c.

Western Empire. See EUROPE, Vol. IV. p. 465; ROME, Vol. VIII. p. 794.

Westfield, a town of Massachusetts, 9 miles by rail W. of Springfield, with a state normal school and varied manufactures. Pop. 9805.

Westgate-on-Sea, a western extension of Margate (q.v.), with an asylum for inebriates.

West Ham. See HAM, WEST.

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Westhoughton, a town of Lancashire, 5 miles E. of Wigan, with manufactures of silk, cotton, and nails, and neighbouring collieries. Pop. (1851) 4547; (1891) 11,077.

West Indies, the great archipelago which extends in a vast curve from Florida in North America to the north coast of South America, separating the Atlantic Ocean from the enclosed waters of the Mexican Gulf and the Caribbean Sea. The name still bears testimony to the belief cherished by Columbus that when he reached in the Bahamas the outlying portion of the New World he was actually on or close to that old-world India which it was his design and hope to arrive at by sailing constantly westwards (see BAHAMAS, COLUMBUS). The name Antilles (q.v.), which is applied to the whole of the islands save the Bahamas, retains a trace of the belief in the old submerged continent of Antiglia. The islands include five larger islands and several more or less well-defined groups—the Bahamas, Cuba, Jamaica, Hayti, Porto Rico, the Virgin Islands, the Caribbee Islands, or Antilles proper, divided into Leeward and Windward. A list of these islands, showing their area, population, and political connection (independent, Spanish, British, French, Dutch, and Danish), is given at AMERICA, Vol. I. p. 223; and there are in this work separate articles on the greater islands and all the groups. Here only a few general remarks are required.

The fauna of these islands, which is Neotropical (see GEOGRAPHICAL DISTRIBUTION), and the geological structure make it probable that in Pleistocene times the islands formed a *terra firma* connecting North and South America. Calcareous rocks predominate on the whole, in some cases overlying granite and other igneous rocks; some of the minor Antilles are wholly volcanic; coral-reefs are found on many of them. The Bahamas are especially low-lying. All the islands except the northern Bahamas are tropical—the extreme limits being 10° and 27° N. lat.—and the climate corresponds to the geographical position, a fair degree of coolness being found at considerable elevations on the higher islands. The year is divided into wet and dry seasons, the principal rainfall being in October, and the longest dry season being from December till April. The islands are liable to severe hurricanes. The luxuriant and varied flora and the productions are best described in the articles on the several islands and groups.

Among great events in the history of the islands as a whole are the discovery (1492); the Spanish occupation; the introduction of negro slaves (1525) to take the place of the native Carib Indians, decimated by forced labour on the plantations; the development of the sugar industry; the gradual intrusion in the 17th century of French, English, and Dutch. Between 1635 and 1719 France secured Guadeloupe, Martinique, Grenada, and St Vincent; in 1632 Tobago and Curaçao became Dutch; in 1623–1763 England obtained possession of St Christopher, Barbadoes, Antigua, Dominica, and the Grenadines. England's growing power at sea forced France to cede St Lucia, Grenada, and St Vincent; and there was fierce fighting in these regions, then and subsequently, between France and England, the great defeat of the French fleet by Rodney off Dominica in 1782 being one of the great naval battles of the world's history. Trinidad was long a bone of contention between France and England; and Hayti (q.v.) has had a very chequered history. The West Indies were long haunted by the Buccaneers (q.v.), and some of them were used by Britain as penal settlements. The abolition of slavery in the English islands (1834–38) is the greatest of recent events, which, however creditable to the public conscience of the nation, has been regarded by the planters and their friends as the main reason for the great decline in prosperity which set in about that time, and from which the islands have but partially recovered.

See, besides guidebooks and works on the several islands, M. G. Lewis, *Journal of a West India Proprietor* (1834); Champlain, *Voyage to the West Indies* (1859); A. Trollope, *The West Indies and the Spanish Main* (1859; new ed. 1869); Bates, *Central America, West Indies, and South America* (1878; new ed. 1882); Charles Kingsley, *At Last* (1869; new ed. 1889); Acosta, *Natural and Moral History of the West Indies* (Hakluyt Society, 1880); Eden, *The West Indies* (1881); Eves, *The West Indies* (new ed. 1891); Froude, *The English in the West Indies* (1888); Paton, *Down the Islands* (1888); Bulkeley, *The Lesser Antilles* (1890).

Westinghouse Brake. See BRAKE.

Westland, a provincial district of New Zealand, was formerly part of Canterbury, and occupies the western portion of the Southern Island. It is 200 miles long by 30 broad. Pop. (1891) 15,882. The chief town is Hokitika (pop. 3000).

Westmacott, SIR RICHARD, R.A., an eminent sculptor, the son of Richard Westmacott, also a sculptor, was born in London in 1775. In 1793 he went to Rome to complete his studies, where he became in some sort a pupil of the celebrated Canova. His progress was rapid, and he carried off the highest prizes, in particular a gold medal given by the pope. In 1797 he returned to London, where his success in his art was not for a moment doubtful. In 1805 he was elected an A.R.A., in 1816 R.A.; and in 1835 the university of Oxford conferred upon him the honorary degree of D.C.L. Two years afterwards the honour of knighthood was bestowed on him. In 1827 he succeeded Flaxman as professor of Sculpture at the Academy. He died September 1, 1856. The works by which he is chiefly known are public monumental statues, in some of which he had much success. Of these it may suffice to mention his monuments in Westminster Abbey to Pitt, Fox, Perceval, and Addison, and in St Paul's to Sir Ralph Abercromby and Lord Collingwood. Many of his works in the antique classical manner are also of exquisite beauty and finish.—RICHARD WESTMACOTT, R.A., son of the foregoing, was born in London in 1799. He passed six years in Italy (1820–26), and after his return to London he gradually won a reputation for himself as one of the ablest sculptors of the day. He was elected F.R.S. in 1837, became A.R.A. in 1838, and R.A. in 1849. He succeeded his father in the professorship of Sculpture in 1859, a post which he filled with distinguished ability and acceptance. He died April 19, 1872. He contributed to three encyclopædias, and wrote a pamphlet on *Colouring Statues*, and a *Handbook of Sculpture* (1864).

Westmeath, an inland county of Leinster, Ireland, between Meath and Roscommon; greatest length NE. and SW., 45 miles; greatest breadth, 25 miles; area, 453,468 acres. The surface is for the most part level, the hilly district in the north not reaching a higher elevation than 710 feet. Geologically, Westmeath belongs to the great central limestone series. Of the numerous lakes which diversify the surface one chain belongs to the basin of the Shannon, which river, with its lakes, forms the western boundary; the other, towards the east, flows into the basin of the Boyne. The Royal Canal traverses the county. The climate is mild and not very moist. The soil is a deep loam, producing herbage especially suited to the fattening of cattle, which are largely fed. There is little tillage, and almost the only cereal crop is oats. The chief towns are the assize town and capital, Mullingar, and Athlone, which is partly

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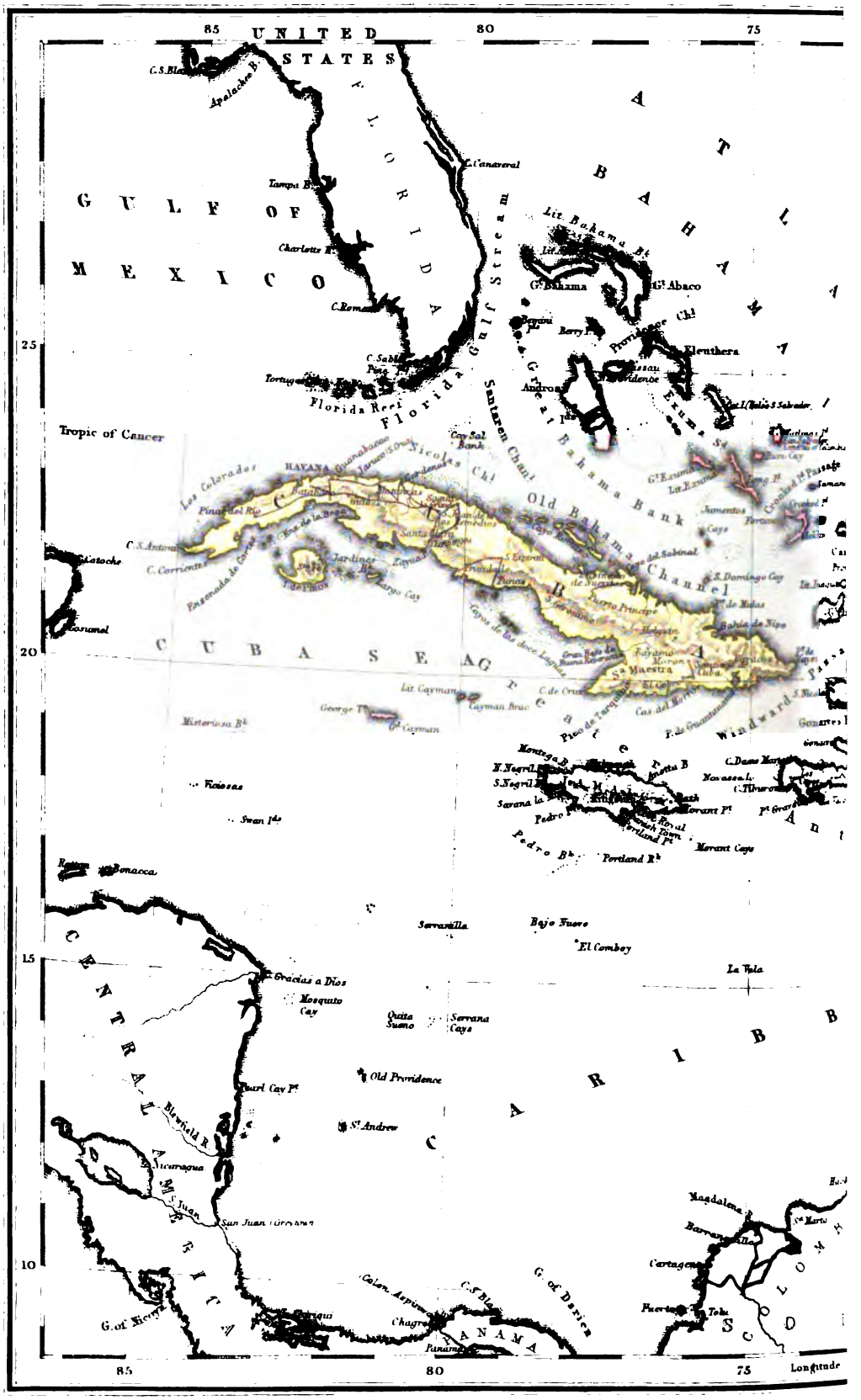

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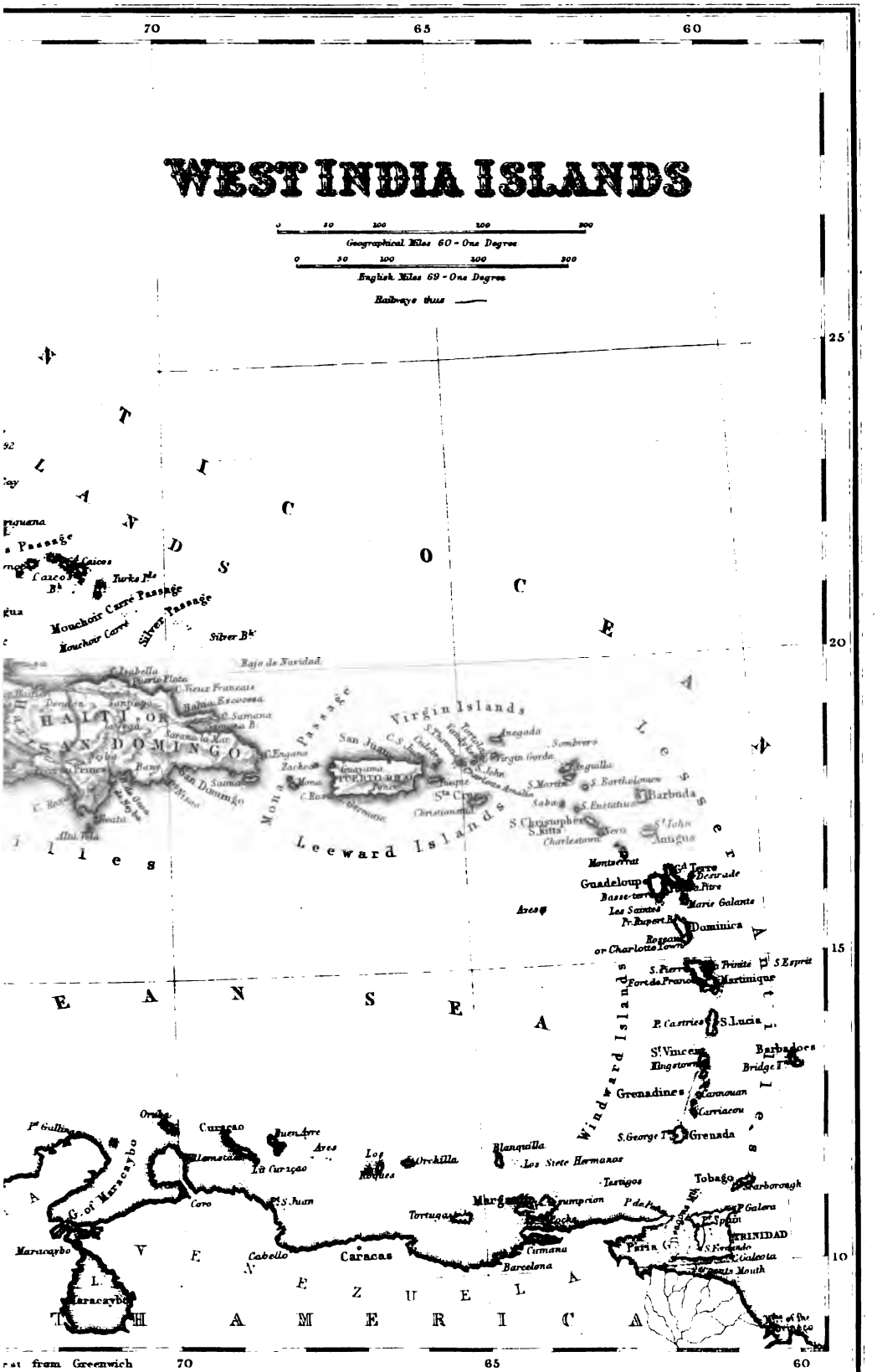
WEST INDIA ISLANDS



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in Roscommon. The county returns two members to parliament, one for the northern and one for the southern division. Westmeath anciently formed a portion of the kingdom of Meath (q.v.), but in the reign of Henry VIII. it was erected into a separate county, and at first included Longford (q.v.) and part of the King's County (q.v.). Many antiquities of the Anglo-Norman period, and some of the Celtic, chiefly tumuli and raths, are found in this interesting and picturesque county. Pop. (1841) 141,578; (1861) 90,879; (1881) 71,798; (1891) 65,028, 59,904 being Roman Catholics.

Westminster. Geographically speaking, the site of Westminster consists of an island in the Thames, named in some old records 'Thorney.' It stands opposite the spot at which the Watling Street from Chester met the Watling Street from Dover, the two ends being connected by a ford. On the Surrey side was a pavement—Stangate—and on the Middlesex side a low hillock—Tothill, which denotes a stopping-place where wayfarers could call—tout—for the ferry. On the building of London Bridge by the Romans traffic through Westminster ceased, and the Watling Street was diverted at what we call the Marble Arch. That Westminster was of early importance, possibly of earlier importance than London, is attested by the discovery of a mosaic pavement near the west end of the Abbey Church. Its position, at the point where the Watling Street emerged from the great Middlesex forest, and where, owing to the great width of the Thames, fording was safe and easy in fine weather, can be made out even on a modern map, where all contours have been so greatly altered by the embankment of watercourses, the levelling of roadways, and the building of houses. The land round the site of the future abbey was covered at every tide. A great estuary appeared at St James's Park, another opposite at Battersea; and at low-water, unless the volume of the Thames was much greater than it is now, the crossing between 'Thorney' and Stangate must have presented little difficulty. But of records on the subject we have none. The now chiefly obliterated geographical feature and the chiefly obsolete local names are our only guides. Westminster as we know it is a city in the newly-constituted county of London, which originally comprised a district extending from the walls of London almost to the village of Kensington. It has, however, been gradually reduced, and the modern parishes of St Bride, St Dunstan, St Paul, Covent Garden, St Anne, St Martin, St James, and St George, with some smaller precincts, have all been taken out of it. At present it consists only of the parishes of St Margaret and St John, and of an outlying district near Kensington Palace. The population exceeds that of the City of London, being 55,760 in 1891—a decrease of more than 4400 since 1881. The name contains a reference to an ancient abbey church, probably founded about the time of Offa, but refounded by Dunstan in the time of King Edgar, and supplied with regular monks. The exact date cannot now be ascertained, owing to a falsification of the only known copy of Edgar's charter, but it must have been about the year 971. The name further contains a reference to another minster, that of St Paul, which, it may be inferred, was older. Edward the Confessor lived chiefly at Westminster, and some of the buildings he provided for the monks may still be seen. He also rebuilt the church, and of his work an archway in the south transept may be identified. Of his palace no trace is left, but it stood, presumably, east of the abbey. The church was consecrated in 1065, and Mr Freeman was of opinion that the ill-fated Harold was crowned in it. The Conqueror was certainly crowned there, and in 1163 Edward the Confessor was canonised. In 1269 a new church, that which we now see, was consecrated, having been built by Henry III. in honor of the royal saint. The church was carried on by successive kings, and, in fact, was not completed till 1735, when the western towers were built, but the nave was finished under Richard II. The chapel of the Annunciation, or chantry of Henry V., was built in the reign of Henry VI. The Lady Chapel, or chapel of Henry VII., an elaborate example of the last phase of the old Gothic style, was built by Henry VIII., who subsequently suppressed the monastery and made Westminster a bishopric, since which the surrounding town has been reckoned a city. James I. set

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Westminster Abbey.

up the last of the royal monuments, those, namely, to his mother, Mary of Scotland, and to his predecessor Elizabeth. The north front was rebuilt by Wren, and was a beautiful example of his taste in Gothic. It was pulled down, and a new and less appropriate design by Mr Pearson substituted in 1890. The church is the burial-place of thirteen kings of England, including Henry III., Edward I., Edward III., Richard II., Henry V., Henry VII., Edward VI., James I., Charles II., William III., and George II., as well as of five queens in their own right, and the queens of many of the kings. In the reign of Richard II. the practice of burying court favourites and others in the abbey commenced, and the first poet to be laid in the south transept, often called the Poet's

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Corner, was Geoffrey Chaucer, who probably owed this distinction as much to the fact that he was clerk of the works in the abbey, and occupied a house on the site of the chapel of Henry VII., as to his poetry. In the same transept are buried Spenser, Dryden, Garrick, Johnson, Dickens, Browning, Tennyson, and others of less note; and many monuments commemorate poets and literary men buried elsewhere. The first Lord Lytton was buried in the chapel of St Edmund. Handel's grave is in the south transept, Dean Stanley's in the chapel of Henry VII. The north transept contains the graves of Mansfield, the two Pitts, the three Cannings, and other statesmen. In the nave are buried Newton, Scott, Street, Livingstone, Ben Jonson, Sir Charles Barry, Robert Stephenson, and Charles Darwin. Nearly all English kings and queens have been crowned here, and since Edward I.'s reign have used the chair holding under its seat the Stone of Scone (see CORONATION).

The abbey did not produce any remarkable literary men, though a chronicle is attributed to one Matthew (q.v.) of Westminster, of whom nothing is known. The last lord abbot, called Boston, as Benson became the first dean. The chapter includes six canons, one of whom is archdeacon.

Shortly before the dissolution of the monasteries William Caxton had set up the first English printing-press in the Almonry, a little to the west of the western front of the abbey. He continued to print books here until his death in 1491. He is commemorated by a monument in the church of St Margaret, where he is buried. The exact site of the Almonry and chapel of St Anne may be identified by a costly but ill-designed red granite pillar, which serves to remind the visitor that the sign of Caxton's house was the Red Pale.

The abbey remains are numerous, some of them being in the occupation of the school; but all the gates, among them the abbot's prison, in which Raleigh spent his last hours, have disappeared, except part of the gate into College Street from Dean's Yard. The cloisters, except for restorations, are unusually perfect, and the domestic buildings of the Confessor's period, and therefore unique in England, are extensive, and would be more so but for the vandalisms of those in authority. It is a singular fact that the best preserved of the domestic buildings of Westminster Abbey are those of which the school has the custody, the fatal injuries to Ashburnham House and to the Dark Cloister having been inflicted by the dean and chapter. The Abbot of Westminster was a peer of parliament, took precedence of all other English abbots, and had an income which would be reckoned at about £60,000 of our money. He had many privileges in common with the Benedictine monks over whom he ruled, and had the custody of many of the crown jewels, and of the whole regalia at the time of a coronation. The dean has succeeded to some of the privileges and more of the duties, and the heaviest part of such a ceremony as the coronation of George IV., or of the Jubilee of Queen Victoria, fell upon him. Abbot Boston or Benson surrendered his house to Thurlby, who for ten years was the first and last Bishop of Westminster. A few years later the dean obtained the old house, all but the hall, which had been given to the school; and the lord of the manor of the church of St Peter resides in his manor-house in the reign of Queen Victoria as he resided in the reign of Queen Elizabeth. While nothing remains to Westminster of the original 'terra Sancti Petri' except St Margaret's and St John's, an outlying corner, probably representing the manor of Neyt, and now known, but only since the reign of William III., as Kensington Gardens (see KENSINGTON), is still reckoned in the parliamentary borough of Westminster. The palace of Kensington is within the boundary. Manorial rights are rather shadowy; but a complete account of the manor of Westminster, with reference to the points where, in the course of ages, it came into contact with municipal life, would be interesting. The Dean of Westminster is still, at least nominally, lord of the manor, and appoints a steward, who is generally some nobleman of high rank. There are also a bailiff and sixteen burgesses. The deanery contains the 'chamber called Jerusalem,' probably from a view of the holy city among its original decorations, approached by the 'chamber called Antioch,' for a similar reason. Jerusalem forms a chapter-house, the original chapter-house in the east cloister having for centuries been used by the House of Commons, and afterwards for the storage of state papers. It is now crown property, and having become ruinous it was almost rebuilt by Sir Gilbert Scott, but contains still some part of its ancient decorations. The school closely adjoins the abbey, and the great school-room is part of the monk's dormitory, an interesting room, much disguised by restorers, but apparently containing remains of the Confessor's buildings. Close to it is a beautiful chamber in the style of Inigo Jones, or Webb. It is known as Busby's Parlour. Farther to the south, and looking into the College Garden—the 'college' here refers to the dean and chapter, not the school—is Lord Burlington's exquisite school dormitory; the interior was never finished, and is very plain. But the most interesting of the post-Reformation buildings belonging to the school is Ashburnham House, which was built either by Inigo Jones or by Webb from his designs. It was much spoilt by the canons who held it as a residence, but the staircase, a complicated design, and two rooms above are in a very superior style. The exterior is plain. The house stands on part of the site of the abbey 'misericorde,' and there are remains of a buttery hatch in the hall. The deposed abbot lived here as dean, while the bishop occupied the abbot's old house, now the deanery. Some eminent men have been masters of the school, which was founded at St Peter's College by Queen Elizabeth in 1560, among them being Camden, the Elizabethan antiquary, Busby, and Vincent Bourne; and among the scholars have been George Herbert, Cowley, Dryden, Prior, Cowper, and Southey, among poets; Wren stands alone among artists; but the list of statesmen includes Warren Hastings, Lord Mansfield, and Lord Russell; Gibbon and Locke represent literature.

The churches of Westminster are now very numerous, but the original parish churches are only St Margaret's and St John's. St Margaret's seems to have first been built a few years before 1140. The people had previously worshipped in the abbey church, and in Domesday the whole of the abbot's manor, which extended then to the walls of London, is designated as 'St Peter's.' St Margaret's has never been remarkable for its architectural features, but as we see it now is in a poor style of Gothic, with many modern additions, such as a porch and new window tracery. The famous Scrope and Grosvenor controversy, when Chaucer gave evidence, in 1386, was held in St Margaret's Church. The headless body of Sir Walter Raleigh was buried in it in 1618. The east window is old Dutch. The church is supposed to be the special charge of the House of Commons. The boundary line between the parishes of St Margaret and St John passes between the two Houses of Parliament, the lords being in St John's, the church of which was consecrated in 1728. It is an unsightly structure, remarkable for four massive corner towers, rendered necessary by the insecurity

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of the building, which is on a swampy site. The architect was Thomas Archer. All the royal palaces of London used to be in Westminster, but since the parish has been dismembered only Whitehall, Kensington, and the Houses of Parliament can be reckoned within the boundaries. St James's is in St Martin in the Fields, Buckingham Palace is partly in St James's, and partly in St George's, Hanover Square. Of Whitehall but little remains. A few fragments of Gothic windows were till 1890 still visible in old houses behind Scotland Yard. The chief relic was till lately the Chapel Royal, Whitehall. Henry VIII. first made a palace here. In 1512 he was burnt out at Westminster, and, having seized Wolsey's house at Charing Cross, he made an arbitrary series of regulations calculated to cut the inhabitants whose houses were north of a line drawn through the middle of the Royal Horse Guards off from their parish church. Being annoyed at funerals passing from one end of the divided parish to the other, he eventually built St Martin's. In 1536 he persuaded his subservient parliament to pronounce the old palace to be only 'a member or parcel' of the new palace at Whitehall. He dwelt much here, and added both to the buildings and the gardens. Holbein is said to have constructed the gate, the stones and terra-cotta of which were subsequently transferred to the Long Walk, Windsor Park, where they slumber in peace under a thick layer of turf, having never been set up again. (View and plans are to be seen in Smith's *Westminster*.) James I. constantly used Whitehall, and set Inigo Jones to design him a great palace on the site. By this design the palace was to stand on both sides of the road to Westminster. Nothing was ever built except the chapel, as it was till lately called, then a banqueting hall. Inigo made a second design for Charles I., in which the palace was to be only half the size, and was not to cross the road. Nothing was ever done, but it is necessary to mention both designs, as most writers mix them up. On the street front of this banqueting house are some blank windows. One of these, the fourth from the north end, was broken through to provide an exit from the ground-floor of the hall to a ladder outside, leading to the scaffold, and by this passage Charles I. went to his doom. The broken wall was identified behind the facing stones some years ago (see Jesse, *Court of England*, vol. i. p. 466). There is much about Whitehall in the diaries of Pepys and Evelyn. The old parts of the palace were burnt in 1697, and never rebuilt, but it is said that a hall of Wolsey's is actually enclosed in the buildings of the Treasury, having been continually altered but never pulled down. The Chapel Royal was closed in 1891, with a view of turning the building into a 'United Service Museum.' It is the fashion just now among the architects of the so-called Gothic revival to decry the merits of this little fragment of Inigo Jones's design, but it is safe to pronounce it the most beautiful building of its size in London.

The present 'palace of parliament' stands on a site consecrated by nearly six centuries of representative institutions. It may have been originally selected by Edward the Confessor, in whose reign the cessation of all further fear of a Danish incursion made it possible for the king to reside habitually without the protection of walls. But according to the local tradition it was Canute or Knut who first lived at Westminster, and here he rebuked the tide. No doubt even the king could not go a hundred yards on foot from Thorney without encountering a tide or a tidal stream. One of the rivulets, the Tyburn, here divides into a kind of delta. Two other brooks surrounded the sacred precincts of the monks, and at least two more divided the mighty Dane from the wide mere of St James's Park. And all these were tidal, as the name of one of them, Mereflete, denotes. Notwithstanding the lowness of the situation thus described, it became the chief residence of successive kings, and, in consequence, the headquarters of the courts of law. The king himself at first heard cases, and, theoretically, continued to hear them until a very late period, seated in the hall of the palace surrounded by his chaplains, who advised him on points of law. The king's exchequer, too, sat in the same place, and certain barons were early appointed to see to matters relating to the royal revenue. There are many other things which connect Westminster with our legal history, but this is not the place in which to detail them. The palace, probably from the time of the Confessor, if not before it, had numerous great public chambers and halls, where cases could be heard, where money could be received and placed in safety, where great court functions could be carried out, where ambassadors could be entertained, and banquets given to hundreds of guests together.

As the centuries went on these chambers formed not a homogeneous house of compact plan such as might be our conception of a palace, but a village of single apartments, such as the Painted Chamber, the Whitehall, the White Chamber, the Star Chamber, the Court of Requests, St Stephen's Chapel, and the Great Hall. To the westward of the Great Hall were the law-courts, and to the north and east the royal apartments. William Rufus rebuilt the Confessor's hall on an immense scale, with round-headed double windows like those still to be seen in the White Tower, some of which are still in existence, but covered up in the masonry at the south-eastern corner. There was a flat roof, supported by rows of oak pillars. Henry III. improved the palace greatly, but kept to the ground-plan laid down by the Confessor. Richard II. transformed the hall. Leaving the old walls standing, he buttressed them strongly, and raised over them the magnificent roof of oak which is still extant and intact. It is 92 feet high. The length of the hall is 290 feet, its breadth 68 feet. In 1512 a fire took place in the royal apartments, and Henry VIII. removed the court first to Bridewell and then to Whitehall, but the law-courts remained at Westminster, as did, oddly enough, the royal nursery, which so closely adjoined the hall that, before the courts were pulled down, the judge's robing-room of the Queen's Bench was the last of the nursery series, adorned with pictures of Heaven, Paradise, Purgatory, and Hell, after which each was called.

The law-courts were fixed in Westminster Hall in 1224. They were frequently rebuilt, but were recently swept away without due consideration, the old buttresses being left bare, and many ancient remains destroyed under the ignorant idea that they formed no part of the original building. Finally, lest any mistake possible should be left uncommitted, a modern professor of revived Gothic was permitted to cover the naked flank of the old hall with a building which makes us regret the courts more than ever. Many of the greatest events of English history, and all the greatest pageants have had their place in this old hall. Here the throne was set up for Henry Bolingbroke to ascend as soon as the constituent assembly had proclaimed the deposition of Richard. Here Sir John Oldcastle, Lord Cobham, was tried and condemned. Here, successively, the Duke of Somerset and his rival, the Duke of Northumberland, and a little later, the Duke of Norfolk, were all tried and condemned. Here Strafford was condemned in the same place occupied by his royal master a few years later. The seven bishops were

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here acquitted, and here the trial of Warren Hastings, the cause of so much wasted eloquence and turgid rhetoric, dragged on wearily for seven long years. In 1834 a conflagration was caused by careless workmen, who, having orders to destroy some fagots of obsolete 'tally sticks,' burned them in the stove of the House of Lords (the old Court of Requests). The result was the destruction of all that remained of the ancient palace, except the hall, the cloister of St Stephen's Chapel, and the crypt. All were worked into Sir Charles Barry's new design for the Houses of Parliament; but the ancient features of the crypt have since been removed, and the curious little chapel of St Mary, which dates from the reign of Edward I., looks like a second-class gin-shop. The whole design of Sir Charles Barry was formed upon the necessity of preserving Westminster Hall, and of making the new building to conform to it. The result is, with the single exception of Windsor Castle, the most successful attempt to build in a revived Gothic style. This is not the place for criticism, but the reader will observe that Barry, whatever his shortcomings, had learned proportion in his Palladian studies, and never depended upon detail. The best parts are the interior courts where there is no ornament, but where the symmetry is very marked. The way in which the old hall is worked in is masterly, the more so as, when we look at the plan, but only when we look at the plan, we perceive that it is not parallel with any of the new buildings. Eastward of the hall the old cloisters of 'fanwork' vaulting are utilised as an entrance-gallery for the members of the House of Commons, and have a doorway opening into the hall. At the south end the site of St Stephen's Chapel forms a grand entrance for both Houses, a beautifully groined gallery, with some interesting statues by Foley, and some others, leading to the Central Hall, a fine octagon, never fully completed. From this point galleries more or less spacious, ornamented with frescoes, lead on the left to the House of Commons, and on the right to the House of Lords. The former is a handsome chamber approached by a lobby, which forms a cube of 45 feet, the House itself being 90 feet by 45, and 45 high. Some modifications of these dimensions have been made from time to time to improve the acoustic qualities of the chamber. The Perpendicular style is rigidly adhered to all through. Turning southward we reach the Peers' Lobby, which is of the same dimensions as the other, but a blaze of gilding and colour. The House of Lords is also very gorgeous, with figured windows, frescoes by Dyce and others, arms of successive chancellors in colour, bronze statues of the barons who extorted Magna Charta, an endless variety of gilt-carving, wide, low red-leather seats, and at one end, under a gilt canopy, the throne, flanked by smaller seats intended originally for Prince Albert and the Prince of Wales. On either side behind the throne are doors which lead into the Princes' Chamber, a kind of robing-room, and beyond it we reach the great and unmeaning Royal Gallery, the object of which is not apparent, unless it be to exhibit the skill of Maclise, who painted on its walls gigantic frescoes of the 'Death of Nelson,' and the 'Meeting of Wellington and Blücher after Waterloo.' The Victoria Tower rises to a height of 340 feet.

Westminster Bridge as we see it is not a very interesting structure, being chiefly constructed of cast-iron. The first bridge here was opened in 1750. It was very picturesque, and figures in some of Turner's pictures, as well as in Wordsworth's sonnet. The architect was Labelye, a Swiss. The Thames is, as we saw above, very wide here, and the bridge was at least 300 feet longer than London Bridge. The present bridge was designed by Page, and completed in 1862. Many great changes have taken place in Westminster. The clearing out of back slums, and the completion of Victoria Street, have created a quarter of rather fashionable residences. Various prisons have been removed, trees have been planted, and palatial houses and hotels have been built. Unfortunately, the architectural taste needed has not been equal to the demand, and a walk from the Abbey to Victoria Station will reveal some ten or a dozen of the most hideous but most costly buildings in the world, and not a single good one. One of the best is a new town-hall, in which, according to Mr Wheatley (*London Past and Present*, vol. iii. p. 461), there are preserved thousands of manuscript books and records, extending from 1464 to the present day. Several charters have also lately been brought to light, the earliest being dated in the fortieth year of Henry III., 1256. By the last Reform Act the old borough of Westminster, which was nearly conterminous with the ancient boundaries of the abbot's manor, was divided, and Westminster, with one member, consists of the parishes of St Margaret and St John. The poll used to be taken in the porch of St Paul, Covent Garden, and lasted sometimes forty days, popular excitement increasing every day.

Of the numerous books on Westminster may be mentioned Widmore's *Enquiry into the Time of the First Foundation of Westminster Abbey* (1743); Bardwell's *Westminster Improvements* (1839); Brayley and Britton, *The Ancient Palace and Houses of Parliament* (1836); Ackermann, *Westminster Abbey* (1812); Neale and Brayley, *Westminster Abbey* (1818); Dart's *Westminster Abbey* (n.d.); Sir Gilbert Scott and others, *Gleanings from Westminster Abbey* (1863); Dean Stanley, *Memorials of Westminster* (1868; supplement, 1869); *Westminster Abbey*, by the present writer, with illustrations by H. Railton (2d ed. 1891); J[odocus] C[rutt]'s *Antiquities of Westminster* (1711); and F. H. Forshall, *Westminster School, Past and Present* (1884).

WESTMINSTER ASSEMBLY, or Assembly of Divines, a celebrated convocation appointed by the Long Parliament for settling the doctrine, liturgy, and government of the Church of England. It consisted of 121 clergymen and 30 laymen—10 of whom were lords and 20 commoners—together with 4 clerical and 2 lay commissioners from the Church of Scotland. Among the more distinguished of the divines were Usher, Saunderson, Reynolds, Brownrigg, Ward, Twisse, Lightfoot, Gataker, Burges, Goodwin, Calamy, and Nye; of the laymen, Selden, Prideaux, the two Vanes, Rouse, Pym, Whitelocke, St John, and Maynard. The Scottish divines were Henderson, Gillespie, Rutherford, and Baillie. Thirty-five of those whose names were contained in the ordinance calling the Assembly, which was dated 12th June 1643, never appeared at the discussions, one or two of them having died about the time of the first meeting, and the others fearing the displeasure of the king. To supply the place of these absentees, some additional members, called the superadded divines, were summoned to attend. This notable Assembly held its first meeting on 1st July 1643, and continued to sit till 22d February 1649, during which time it met 1163 times. Its most important work was concluded long before. One of the first things it did was to sanction the *Solemn League and Covenant*, against which Dr. Burges alone stood out for several days. The Presbyterians formed a large majority, and exercised a corresponding influence. In doctrine the members were almost unanimous; but on the subject of church government opinions extremely opposite were maintained with keenness, especially on the question touching the sphere and limits of the civil power in matters ecclesiastical. The principal

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fruits of its deliberations were the *Directory of Public Worship*, submitted to parliament April 20, 1644; the *Confession of Faith*, October and November 1646; the *Shorter Catechism;* and the *Larger Catechism*, 22d October 1647. These several formularies, which contain a clear and rigid embodiment of Calvinistic theology and Presbyterian church government, constitute to this day the authorised Presbyterian standards. The *Directory of Public Worship* was ratified by both Houses of Parliament, October 2, 1644, and the doctrinal part of the *Confession of Faith* in March, 1648.

See Baillie's *Letters;* Lightfoot's *Journal;* Hetherington's *History of the Assembly* (1843; 6th ed. 1891); Masson's *Milton* (vol. ii. 1871); Gardiner's *History of the Civil War* (3 vols. 1886–91); *Minutes of the Assembly*, edited by Mitchell and Struthers (1874); A. F. Mitchell's *Baird Lectures* (1882). See also CONFESSIONS, COVENANT, PRESBYTERIANISM.

Westmorland, a northern county of England, bounded by Cumberland, Durham, Yorkshire, and Lancashire. With a very irregular outline, it has an extreme length from north to south of 32 miles, an extreme breadth from east to west of 40 miles, and an area of 505,864 acres or 790 sq. m. The surface is mountainous, the highest summits being Helvellyn (q.v., 3118 feet) on the Cumberland boundary, Bow Fell (2959), Fairfield (2950), Dufton Fell (2803), and Dun Fell (2780). The western portion of the county belongs to the Lake District (q.v.), its lakes including Windermere (q.v.) on the boundary with Lancashire, and Ullswater (q.v.) on that with Cumberland, besides Grasmere, Howes Water, Rydal Water, &c. The moorlands —to which Westmorland owes its name—are numerous and extensive; but along the courses of the Kent in the south and the Eden in the north (the principal streams) there are tracts of fertile land. Of the 400,000 acres in cultivation less than 90,000 are under corn; woods and plantations cover 17,000 acres. The climate is moist and mild, but with often much snow in winter. Coal, lead, copper, slate, and graphite are the chief mineral productions. Westmorland, which is in the diocese of Carlisle, comprises four wards, 109 parishes, and the towns of Appleby, Ambleside, and Kendal. Its county councillors number fifty-six, and it returns one member for each of its two divisions—the Northern or Appleby and the Southern or Kendal. Worthies, besides those noticed under the LAKE DISTRICT, have been Bernard Gilpin, Catharine Parr, Ann Clifford, Countess of Pembroke, Bishop Watson, and Sir J. G. Wilkinson; and Clifton Moor was the scene of a Jacobite skirmish (1745). Pop. (1801) 40,805; (1841) 56,454; (1881) 64,191; (1891) 66,098. See the *Quarterly Review* for January 1867; works cited there and at LAKE DISTRICT; and E. Bellasis, *Westmorland Church Notes* (2 vols. Kendal, 1892).

Weston-super-Mare, a fashionable watering-place of Somersetshire, on the Bristol Channel, 20 miles SW. of Bristol. Grown from a fishing-village since 1805, it is sheltered by rocky, fir-clad Worle Hill (306 feet); commands a splendid view over to Wales; and has an esplanade (begun 1825) 3 miles long, a promenade pier (1867) 1040 feet long, the Prince Consort gardens, a sanatorium, potteries, &c. Pop. (1851) 4034; (1891) 15,873.

Westphalia, a name given to a duchy and a kingdom, and now to a Prussian province, is derived from the *Westfalen*, a western tribe of Saxons, dwelling in the region of the Ruhr and Lippe rivers, as distinguished from the Ostfalen, nearer the Elbe. About 1180 it came under the Archbishops of Cologne, as Dukes of Westphalia. It was the headquarters of the Vehmgerichte (q.v.). Under the Emperor Maximilian part of old Westphalia with parts of Oldenburg and Hanover was made a 'circle' of the empire; while the duchy fell into the circle of the Lower Rhine. In 1801 all the country west of the Rhine was made over to France, and the duchy granted to the Duke of Hesse-Nassau as compensation for his losses to the west of the Rhine. In 1807 Westphalia, with parts of Hesse, Hanover, Brunswick, and Saxony, was made into a kingdom for Jerome Bonaparte, and designed to be the centre of the Confederation of the Rhine (q.v.). In 1813 the kingdom came to an end, and the Congress of Vienna assigned the present province of Westphalia to Prussia. This province has an area of 7892 sq. m. (larger than Wales), and a pop. (1890) of 2,428,661, of whom 1,145,627 were Catholics. The northern portion belongs to the great north German plain, and is not fertile; the south is hilly, with fertile valleys. Westphalian hams are still in high repute; but Westphalia's peculiar wealth lies in its mineral treasures—iron, zinc, copper, sulphur, with lead, antimony, &c. Iron-working is largely carried on, and linen-weaving has been an important industry since the 14th century—Bielefeld being the great centre. Münster has cotton-works.

The peace of Westphalia, concluded at Münster and Osnabrück 24th October 1648, brought the terrible Thirty Years' War (q.v.) to an end. The main advantage to the Protestant party was the securing of religious toleration. Both parties agreed to abide by the distribution of territories as at 1624. The Lower Palatinate was restored to the son of the Elector Palatine; the Upper Palatinate to Bavaria. Part of Alsace was definitively ceded to France; western Pomerania, Bremen, and Verden fell to Sweden, which in virtue thereof became a member of the Holy Roman Empire. Brandenburg and Hanover obtained some secularised church lands; and the independence of Holland and Switzerland was formally recognised. The sovereignty of the different states of the empire was recognised to an extent that seriously weakened the strength and unity of the empire.

West Point, site of the United States Military Academy, and of a ruined fortress dating from the war of independence, on the right bank of the Hudson River, 48 miles by rail N. of New York. The Military Academy is on a plateau 188 feet above the river, surrounded by the bold scenery of one of the finest river-passes in the world. The forts and a river chain were taken by the British in 1777, but abandoned after Burgoyne's surrender, and stronger forts were built, which General Arnold bargained to betray—a plot foiled by the arrest of Major André. The academy was established in 1802. Education there is gratuitous, the government allowing the cadets $540 per annum. One cadet may be appointed by the representative of each congressional district, and ten by the president; but the average number is about 275. The cadets are organised for military purposes into a battalion of four companies, officered from among themselves. The discipline is exceedingly strict, no less than three hundred offences being scheduled, with their corresponding punishments. Only one furlough of two and a half months is allowed during the four years' course. In summer all but the new sophomore class are encamped for training. The standard of education is very high. The entrance examination, though confined to the common English branches, is so severe that many candidates each year are rejected; and of those that enter less than half ever graduate. Besides seven professors, the staff includes thirty assistants, officers selected from the army. It may be added that post-graduate schools have been established—for artillery at Fortress Monroe, for infantry and cavalry at Fort Leavenworth, and for the engineers (which the first five of each graduating class have the privilege of entering) at Willet's Point.

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Westport, a seaport of County Mayo, at the head of Clew Bay, 13 miles SW. of Castlebar by rail; pop. 4469.

West Prussia. See PRUSSIA.

West Troy, a town of New York, on the Hudson, opposite Troy. It has various manufactures, and contains a national arsenal. Pop. (1890) 12,967.

West Virginia, a state of the American Union, the thirty-fifth in area and twenty-eighth in population, is the most irregular in form of all the states. Nearly all the boundary lines follow the courses of rivers or the crests of mountain-ranges. In the north a narrow wedge-shaped strip of land, called the 'Pan-handle,' projects along the Ohio River between the states of Ohio and Pennsylvania. The eastern edge of the 'Pan-handle' and a portion of the northern boundary adjoin Pennsylvania. The remaining portion of the northern boundary is formed by the Potomac River, which separates the state from Maryland; and that state also forms a part of the eastern boundary. Virginia lies to the south and south-east, and on the west are Kentucky and Ohio. Area, 24,780 sq. m.

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In the north-east a small portion of the state belongs to the Shenandoah valley. Thence westward and south-west to the Big Sandy River stretches a narrow belt, called the 'mountain region,' formed by the western ridges of the Appalachian system. This portion of the state consists of sharp parallel ranges interspersed with narrow fertile valleys which increase in width toward the west. In the north the streams are tributary to the Potomac, but toward the south they frequently cut through the mountain-ridges in deep gorges, flowing toward the west or north-west to the Ohio River. The massive sandstone summits of the mountains have been so cracked and fissured by the original upheaval and by subsequent erosive action upon the softer strata beneath that the streams have carved cañons in some cases nearly 1000 feet in depth. To the west of this region lies a broad belt known as the 'hilly region,' a portion of the Appalachian or Cumberland plateau. It has suffered a vast amount of denudation, and its diversified structure is entirely the result of erosion. It comprises a multitude of hills with V-shaped depressions in which the streams flow, generally toward the west. If the streams follow a north and south course, they cross this elevated region in deeply eroded valleys and cañons. In some cases there are fertile bottom lands of considerable extent, and the hills above the valleys form broad flat-topped plains, surmounted, where some outcropping rocks have resisted the destructive agencies of rain and frost, by elevations which are higher than portions of the mountain-region. There is a gradual descent toward the Ohio River, which, however, throughout much of its course flows between high sharp-backed hills. A large part of the state is well wooded, and the timber resources are of great importance. The climate is free from extremes, and is remarkably pure and healthful. The abundance and equable distribution of the rainfall, together with the general fertility of the soil, afford excellent opportunities for agriculture. In the mountain region there is an abundance of fine pasturage, and the annual product of butter and cheese is very large. The most valuable natural resources of West Virginia are its coal and iron. The great Appalachian coal-field passes southward from Pennsylvania and covers almost the entire state. In area it is much greater than the whole coal region of Great Britain and considerably larger than the Pennsylvania field. The coal is of the highest quality, and embraces all grades of bituminous, steam, cooking, and gas coals. The erosion of the surface, already mentioned, has left the coal seams in such condition that they may be worked with great economy, and the increased facilities for transportation have greatly stimulated mining operations. West Virginia already ranks fourth among the states in its coal output (6,231,880 tons in 1889), and second in the production of coke. The pig-iron and steel products are increasing, and in the manufacture of iron and steel nails the state holds a high rank. Salt and petroleum-oil are important natural products. In the south and south-east are numerous mineral springs, of which the White Sulphur Springs are the most widely known.

The state contains fifty-four counties, and returns four representatives to congress. The chief cities are Wheeling, Charleston, the capital, Huntington, and Parkersburg. There is an efficient system of free public schools and normal schools. At Morgantown is situated the state university, and there are numerous private schools and several institutions of higher learning. Until the time of the secession of Virginia that state included West Virginia; but the inhabitants of the northern and western counties remained loyal to the federal government, and in 1863 West Virginia became a separate state, and was admitted to the Union. Pop. (1870) 442,014; (1880) 618,457; (1890) 762,794.

Westward Ho, on the coast of North Devon, 2½ miles W. of Bideford, owes not merely its name but its existence to Charles Kingsley's Elizabethan romance (1855), which attracted swarms of visitors to North Devon. For their accommodation this pretty cluster of villas and lodging-houses, with its church, hotel, club-house, and college, has sprung up since 1867. The bathing facilities are excellent, and it is a great resort of golfers. The village is in the parish of Northam.

Wetherell, ELIZABETH. See WARNER, SUSAN.

Wetstein, JOHANN JAKOB, a great New Testament scholar, was born in Basel, March 5, 1693. At an early age he gave himself to the studies of his life, and after travelling in France and England he returned in 1720 to become assistant to his father in St Leonard's Church at Basel. He continued the study of the New Testament text, and his boldness and originality soon brought him under suspicion of heterodoxy. His rejection of the θεός for ὅς in the *textus receptus* of 1 Tim. iii. 16—now admitted by all who know anything of exegesis—was denounced as an attempt to destroy one of the buttresses of Christ's divinity, and Wetstein was deposed for alleged Socinianism (1730). But in 1733 he was called to the chair of Church History in the Remonstrants' College at Amsterdam, and there he lived till his death, March 22, 1754. The prolegomena to his famous edition of the Greek Testament appeared anonymously in 1730; the text followed in two volumes folio, 1751–52. See L. Meister, *Helvetische Szenen der neueren Schwärmerei und Intoleranz* (Zur. 1785).

Wette. See DE WETTE.

Wetter, LAKE (*Vetter*), after Lake Wener (q.v.) the largest lake in Sweden, lies in Gothland, 25 miles SE. of Lake Wener. It is 70 miles long, 13 miles in average breadth, has an area of 850 sq. m., is 370 feet in greatest depth, and is 270 feet above the level of the Baltic. It receives about ninety small tributaries and has an outlet in the Motala River, which, flowing eastward, maintains the communication of the lake with the Baltic. It is fed mainly by springs from beneath. Its waters are clear, and of a beautiful green colour, and it is surrounded by lofty romantic shores, almost unbroken by bays. It is remarkable

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for an irregular alternation of risings and fallings, and for an occasional violent undulation in perfectly still weather. An intricate chain of small lakes, continued westward by the Göta Canal, connects it with Lake Wener, and thus with the Cattegat. Lake Wetter contains few islands.

Wetterhorn ('Peak of Tempests'), a lofty mountain of the Bernese Oberland, east of the Grindelwald, 10 miles SE. of the Lake of Brienz. The three peaks of the Wetterhorn are respectively 12,149, 12,165, and 12,110 feet high, and were first ascended in 1844 and 1845.

Wetzer, HEINRICH JOSEPH, joint-editor with Benedikt Welte of the great Roman Catholic theological encyclopædia, was born at Anzefahr in Hesse, March 19, 1801, studied at Marburg, Tübingen, and Paris, became professor of Oriental Philology at Tübingen in 1830, and died in Freiburg, November 5, 1853. He began the publication of the *Kirchen-Lexikon der Katholischen Theologie* in 1846; the 12th volume appeared in 1860. A new edition was begun by Hergenröther, and continued by F. Kaulen (1882 *et seq.*).

Wetzlar, a small town of Rhenish Prussia, charmingly situated on the Lahn, 40 miles by rail N. of Frankfort-on-the-Main; pop. 7844. Part of its old cathedral dates from the 13th century. Wetzlar is the scene of the *Sorrows of Werther*.

Wexford, a maritime county of the province of Leinster, bordering on Wicklow, Carlow, Kilkenny, and Waterford; greatest length, 55 miles; greatest breadth, 30 miles; area, 573,200 acres. The coast-line is irregular, and very dangerous for shipping. The headland called Carnsore Point is the south-eastern extremity of Ireland. The greater part of the surface is level, but Mount Leinster, the highest point of the mountains of the border, is 2610 feet high. The principal river is the Slaney, which enters the sea through Wexford Harbour; the Barrow is part of the boundary. In its geological structure Wexford belongs to the eastern clay-slate tract; granite is found in the south-east of the county, and in some of the detached hills, as are also beds of greenstone. The soil varies from light and sandy to stiff clay, but the county has a verdant luxuriance. There are but few and inconsiderable manufactures, and the trade is chiefly in the export of agricultural produce, especially barley; butter, cattle, pigs, poultry, and eggs are also exported in large quantities. The fisheries are valuable. The principal towns are Wexford, Enniscorthy, New Ross, and Gorey. The maritime position of Wexford laid it open early to the incursions of the Danes. It was the first landing-place of the English, and formed part of the tract granted to them by MacMurrough. During the civil wars which followed 1641 Wexford was the scene of frequent contests; and in the insurrection of 1798 it formed the theatre of the only formidable conflicts of the peasantry with the regular troops. There are numerous relics of antiquity, Celtic as well as Anglo-Norman, including many old castles, and the monasteries of Dunbrody, Tintern, and Ross. Wexford returns two members to parliament. Pop. (1841) 202,196; (1861) 143,594; (1881) 123,854; (1891) 111,536, of whom 102,002 were Roman Catholics.

WEXFORD, the capital, a seaport and municipal borough, is situated at the mouth of the river Slaney, 93 miles S. of Dublin by rail. The estuary of the Slaney forms Wexford Harbour, which, though spacious, is shallow and impeded by a bar. The town has several churches, Catholic and Protestant, a convent and nunneries, and conventual schools. Parts of the old fortifications and of St Selsker's priory remain. The town is extremely ancient, and was occupied by the Danes as one of their strongest settlements; and from the time of the invasion it became an English stronghold against the native population. During the civil wars of 1641 it was occupied by the confederated Catholics, but was taken by Cromwell in 1644. The insurgents of 1798 also had possession of it for a short time. Till 1885 it returned a member to parliament. Pop. (1881) 12,163; (1891) 11,541.

Weyden, ROGIER VAN DER (1400–64), painter of the older Flemish school, who, born at Tournay, was in 1432 master of the St Luke's guild, and by 1436 official painter to the city of Brussels. He spent some time in Rome. A continuator of the work of the Van Eycks, he was himself the founder of a Brabant school; and he had Memling and many Flemish and German painters amongst his scholars. A 'Descent from the Cross,' now at Madrid, is a famous work of his; there are others at Berlin, Vienna, Munich, and several of the Low Country towns. There is a monograph by Wauters (Brussels, 1856).

Weymouth, a fashionable watering-place of Dorsetshire, 7½ miles S. of Dorchester, 77 S. of Bristol, and 145 WSW. of London (128 by road). It lies at the mouth of the little Wey, on a beautiful bay, bounded E. by St Albans Head and W. by the 'Isle' of Portland (q.v.), and here divided by the projecting Nothe into Weymouth Bay and Portland Roads. The Wey, after widening into the tidal 'Backwater,' enters the sea, and separates the two quarters of the town—old Weymouth proper on the south, and modern Melcombe-Regis, facing the bay, on the north. Both were separate boroughs till 1571, and they still returned two members apiece till 1832, then two conjointly till 1885. A bridge, reconstructed in 1881, connects them; and Melcombe-Regis, which rose into repute through George III.'s frequent visits from 1789, has capital sands, an esplanade over a mile long, statues of King George (1809) and Sir H. Edwards (1885), numerous hotels, and a pile pier 1050 feet long, constructed in 1859 at a cost of £12,000. The Nothe has been strongly fortified since the Crimean war. There is some shipping, steamers running between here and the Channel Islands, and an export trade in Portland stone and Roman cement. Thomas Love Peacock was born here, and here Southey first saw the sea. Pop. (1821) 6622; (1851) 9458; (1891) 13,769. See works by G. A. Ellis (1829) and Robert Damon (1860).

Weymouth, a township of Massachusetts, on Massachusetts Bay, 12 miles by rail SSE. of Boston, containing the four post-villages of Weymouth, and East, North, and South Weymouth, with large factories of nails, boots and shoes, &c. Pop. 10,866.

Whale. The name may be taken as equivalent to Cetacean, and applied to any member of that order of mammals, which includes two great sets: the toothed whales, such as Sperm-whale and Dolphin, and the whalebone whales, such as Right Whale and Rorqual, in which the teeth are only embryonic. The general characters of the order are summed up in the article Cetacea (q.v.). The order Cetacea is usually divided into three sub-orders: (1) the Mystacoceti or Balænoidea, baleen or whalebone whales; (2) the Odontoceti or Delphinoidea, toothed whales; and (3) the Archæoceti or extinct Zeuglodonts. The differences between the extant sub-orders are so great that any idea of close relationship must be abandoned; their common ancestry must be far back, and indeed it is doubtful whether our classification might not be brought nearer the truth by recognising two distinct orders. Less specialised than the modern types are the extinct Zeuglodonts of the Eocene period, but it is by no means certain that they should be included within the order Cetacea.

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Baleen Whales.—Baleen consists of a double series of 300 to 400 horny plates, which grow from the palate and hang down into the mouth. Each plate is somewhat triangular, the base being rooted in the palate; both apex and inner edge are frayed into hairy shreds. These plates grow from parallel ridges on the palate, which are covered with long vascular papillæ. These papillæ become horny

Fig. 1.—Skull of Arctic Right Whale, showing baleen plates in position.

and fuse together to form the plates. The whale is wont to swim with open mouth through shoals of pelagic animals; having secured a good mouthful, it closes its jaws, raises its tongue, allows the water to strain out at the sides through the baleen plates, on the edges of which the food is caught. Thence it is swallowed. In short, the apparatus serves as a strainer or sieve.

There are five extant genera of baleen whales, of which the best known are the Right Whales (Balæna) and the Rorquals (Balænoptera). In the genus Balæna the skin of the throat is smooth, there is no dorsal fin, the neck vertebræ are fused, the fore-limb is short, broad, and five-fingered, the head is very large, the baleen plates are very long, narrow, and black. The Greenland or Arctic Right Whale, or Bowhead (*Balæna mysticetus*), of circumpolar distribution, measures 45 to 50 feet in length, the head forming more than one-third of the whole. It surpasses every other species both in quantity of oil and in length, quantity, and quality of whalebone, a large example yielding 275 barrels of the former, and 1¾ ton of the latter. The blubber may be 16 inches in thickness. The huge animal

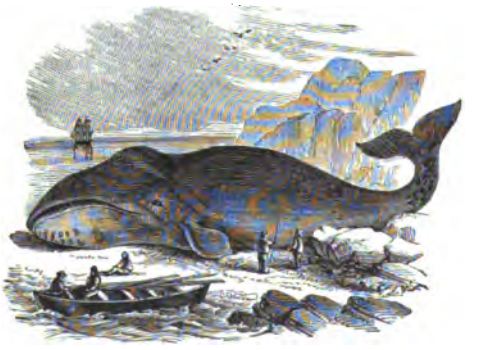

Fig. 2.—Arctic Right Whale.

feeds for the most part on very minute crustaceans. The Southern Right Whale (*B. australis*) inhabits the temperate seas of both hemispheres, apparently with local varieties in different regions. In many ways it resembles the Arctic species, but has a relatively shorter head, shorter baleen, and a different body contour. The 'Humpback' (*Megaptera boops*) is about the same size as the Arctic right whale, but has the skin of the throat plaited, a low hump-like dorsal fin, free neck vertebræ, very long and narrow four-fingered pectoral limbs, a head of moderate size, short and broad baleen plates. It is common in the North Atlantic between Norway and Greenland, and occasionally visits British coasts. Other forms, perhaps of the same species, occur in the South Atlantic and in the Pacific. For Balænoptera, see RORQUAL. The two other extant genera of Balænoidea are represented by the rare *Neobalæna marginata* from Australian seas, the smallest of whalebone whales, not exceeding 20 feet in length; and *Rhachianectes glaucus*, the Gray Whale of the North Pacific, from 35 to 40 feet long.

Toothed Whales.—The Odontoceti are represented by many more forms than the Mystacoceti, and there is a much greater diversity of type. The Cachalot, or Sperm Whale (*Physeter macrocephalus*), the only representative of its genus, is a huge Cetacean widely distributed in 'schools' in tropical and subtropical seas. 'The length of the full-grown male is from 55 to 60 feet, but the female is stated not to reach more than half that size.' The lower jaw bears on each side twenty to twenty-five strong, conical, recurved teeth, fixed in a long groove and not in distinct sockets; the shape of the skull is very unlike the shape of the head, for while there is a very long rostrum and a deep

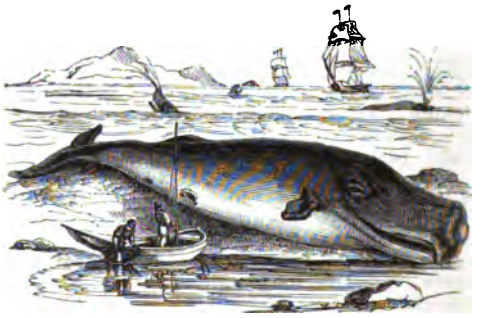

Fig. 3.—Cachalot, or Sperm Whale.

basin-like concavity on the upper surface of the skull, the head is rounded and truncated in front; the bulk of the head above the cranium consists of tough fat or 'junk,' but above this there is a large 'case' containing fluid oil and a granulated substance which yields 'spermaceti;' there is a very long mandibular symphysis; the head is about a third of the total length; the somewhat sigmoid blow-hole is at the anterior end of the head, slightly to the left side; the mouth is ventral behind the end of the snout, the lower jaw may be let down almost at right angles to the upper, and the gape is thus enormously wide; the throat, unlike that of the baleen whales, is also wide, sufficient it is said to admit a man's body; the pectoral limbs are short and broad; the dorsal fin is represented only by a low protuberance. The sperm whale feeds chiefly on cephalopods. The 'schools' may consist of hundreds, led by two or three large bulls; the females often endanger their own safety in aiding their offspring to escape; the bulls sometimes fight desperately with one another, or with their persecutors, and are said to sink not only boats, but even whaling vessels. Apart from oil and spermaceti, the cachalots yield 'ambergris,' an intestinal concretion of strong odour, formerly used in medicine, now restricted to perfumery. The Cachalot is not frequent on European coasts, but is said to have occurred in the Mediterranean, and has been occasionally stranded on British shores.

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Within the same family as the sperm whale is the imperfectly known *Cogia breviceps*, a small whale about 10 feet in length, met with at various distant localities in the Southern Ocean, and also off the coast of Madras, and in the North Pacific; the 'Bottlenose' (*Hyperoödon rostratus*), regularly hunted in the North Atlantic, besides several other forms. Very remarkable are the fluviatile and estuarine Platanistidæ, the blind Platanista of the Ganges, Brahmaputra, and Indus, Inia in the Amazon, and Pontoporia in the estuary of the Rio de la Plata. The Delphinidæ are represented by numerous forms—e.g. the Arctic Narwhal (*Monodon monoceros*), remarkable for the enormous single tusk of the male; the Beluga (*Delphinapterus leucas*), a pure white Arctic whale occasionally coming as far south as Scotland and the St Lawrence; the Common Porpoise (*Phocæna communis*); the killer or 'Grampus' (*Orca gladiator*); the Caaing Whale (*Globicephalus melas*); the Common Dolphin (*Delphinus delphis*); and many others.

Whale 'Fishery,' as it is popularly called, seems to have originated in ancient times and independently in many parts of the world. Indians, Eskimos, Japanese, Tartars, and Norsemen were among the early whale-hunters. When the Atlantic right whale was still common, its pursuit was a recognised occupation of the seafaring folk of the Biscayan and Basque provinces, from the 10th to the 16th centuries. As whales became scarce in southern seas, the fishery moved northwards, and squabbles arose among the nations as to the various 'grounds,' which are now regarded as unrestrictedly international. The Dutch founded the settlement of Smeerenberg, in Spitzbergen, as a provisioning centre for the whalers and a melting-place for the whales; but by-and-by this was abandoned, for the whales were driven off and the fishery shifted to Greenland, whence the blubber was sent direct to Holland. In 1680 the Dutch had 266 ships and 14,000 sailors engaged in whaling, and for many years it was from Holland that the chief oil-supply of Europe was drawn. Soon, however, a decline set in, and towards the end of the 18th century the Dutch fishery had almost ceased. From 1732 to 1824 the British whalers were stimulated and subsidised by a government bounty of so much per ton, yet in 1815, when the British whale-fishery was in its most flourishing condition, only 164 ships were engaged in it. By 1828 the number had, however, fallen to 89 vessels, 49 of which were fitted out at Scottish ports. In that season 1197 whales were captured, the result being 13,966 tuns of oil and 802 tons of whalebone. At present Dundee and Peterhead are the chief centres of the British whaling industry, but the number of vessels employed by the two ports is not more than 30. During the 18th century 'a new competitor had entered the field, and soon distanced all others.' In New York and Delaware, New England, and California whaling became an important industry, and as the whales retreated from persecution they were followed as far as Newfoundland. 'About 1750 the distant fishery was prosecuted with vessels of as much as 130 tons. New Bedford, destined to become the metropolis of the American whale-fishery, entered upon the business about 1755. In 1765 Boston had a hundred small vessels.' Towards the last quarter of the 18th century the whalers became more adventurous, and voyaged to the Brazil Banks, Cape Verde Islands, West Indies, &c., but further progress was stopped by the revolutionary war, and many American whalemen sought fortune in Europe. 'The first whale-ship that ventured into the Pacific was sent from England in 1787, and was manned by Nantucket men.' Subsequently the coasts of Chili and Peru and of East Africa were visited. In 1839 the American whale-fishery, having recovered from its temporary decline, boasted a fleet of 557 vessels. In 1846 the whaling-fleet consisted of 678 ships and barques, 35 brigs, and 22 schooners, but soon after this date the fishery began to decline.' (See Mr W. N. Lockington in the *Standard* or *Riverside Natural History*.)

Nowadays a whaler is a ship of 300 to 500 tons, with four or more five-oar boats, with an entire company of not less than thirty-five souls. There are hundreds of specialised appointments—e.g. windlasses for raising the blubber, boilers for 'trying' or melting the blubber, tanks for storing the oil. The crew are usually shipped on a profit-sharing system. A whale-boat is 28 to 30 feet by 6, sharp at both ends, and with sloping sides. It is manned by 'boat-header,' boat-steerer, and four men. It carries a long line coiled in one or two tubs, and arranged to run in a convenient manner when the harpoon to whose end it is fixed has struck a whale. And besides the essentials—harpoon and line—there are numerous accoutrements—e.g. lances, bomb-gun, and harpoon-gun. From a distance of about 3 fathoms the boat-steerer throws his harpoon, or more than one; if it strikes, the oarsmen back water vigorously to escape the not unfrequent blow of the whale's flukes. If the whale is fast, its behaviour regulates the working of the boat; but whether the victim 'runs,' or 'sounds,' or 'brings to,' the whalemen do their utmost to get as soon as possible within range of lance or gun.

Economic.—As is well known, whales are chiefly valuable on account of the oil yielded by the blubber and the whalebone or baleen. Spermaceti and ambergris have a subsidiary economic importance. As to the oil, which was formerly the most remunerative result of whaling, it must be remembered that the use of gas and other modern illuminants has reduced the necessity of having oil-lamps, and that mineral and vegetable oils are now used for many purposes—e.g. 'batching' jute, for which whale-oil was once in great request. Still, however, the oil finds a ready sale, the sperm-oil of Physeter having a distinct precedence over the train-oil of the baleen whales. For whalebone, spermaceti, ambergris, see separate articles.

It must be admitted that although great prizes are sometimes won by the whalers, the fishery is somewhat of a lottery. Apart from the dangers of shipwreck, exposure, and starvation, now happily diminished, the vessel may come home 'clean,' or without a single fish. It is recorded that a Peterhead whaler once captured in one season forty-four whales, and returned with a cargo of oil and whalebone valued at over £10,000; and that the *Arctic* of Dundee, under Captain Adams, once brought home the produce of thirty-seven whales, including about 18 tons of baleen. But such cases are rare, and, considering the diminished demand for whale-oil, and the fact that whalebone is not more necessary to civilisation than spermaceti or ambergris, it may be reasonably doubted whether the whale-fishery, except as a safety-valve for the adventurous or as an opportunity for scientific research, is worth the candle, or warrants the persecution of the noblest animals which have their home in the sea. In illustration of the growing scarcity, it may be noted that in 1892 three whalers left Dundee to hunt in the Antarctic.

See AMBERGRIS, BELUGA, BOTTLEHEAD, CAAING WHALE, CETACEA, DOLPHIN, GRAMPUS, NARWHAL, OILS, PORPOISE, RORQUAL, SPERMACETI, &c.; W. H. Flower and R. Lydekker, 'Introduction to the Study of Mammals' (1891); Brehm's *Tierleben* (3d ed. vol. iii. 1891; *Standard* or *Riverside Natural History* (ed. by J. S. Kingsley), 'Cetacea,' by W. N. Lockington (Lond. 1888); Cassell's *Natural History* (ed. by P. Martin Duncan), 'Cetacea,' by J. Murie; J. Hunter, 'Observations on Structure and Economy of Whales,' *Phil. Trans.* (1787); W. Scoresby,

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WHALEBONE consists of the baleen plates of the Arctic and allied whales. They are, however, not bone at all in the ordinary sense of the word, but consist of an epidermic substance more resembling hair in its nature. The baleen, which occurs in triangular plates, only requires to be scraped and softened, by boiling it for ten or twelve hours, to bring it into a proper condition for use. It is then cut into strips of various sizes for the market. For some purposes whalebone excels in usefulness any other known substance, as it has great flexibility combined with lightness and strength; but its toughness, the ease with which it can be split, and its power to stand without change a heat considerably above ordinary temperatures add to its value. The high price which whalebone has reached precludes the possibility of its being used so extensively as it was in former years. It is still made into brushes for street-sweeping machines, for cleaning flues, and for other purposes in which they are subjected to much tear and wear. Dressmakers and milliners also employ it to a limited extent. Steel wires, as they take up less room, took the place of whalebone for umbrella frames about the middle of the 19th century. The earlier whalebone umbrella-stretchers were as much like spokes of wheels as wires. For other purposes steel, vulcanite, and cane are substitutes for whalebone, but in some cases only indifferent substitutes. The lowest price of whalebone during the 18th century was £350 per ton, but early in the 19th it had fallen to £25, and even as late as 1868 did not fetch more than £40. In 1882 it had advanced to £1150, and in August 1892 it had reached the very high figure of £2925 per ton. This, however, is for dry whalebone a year old. New whalebone, which is not so free of moisture, is worth about £2500 per ton. Nowadays an average sized Arctic whale yields about 10 cwt. of whalebone, but in former years 1½ ton was occasionally obtained from a single 'fish.'

Whale-louse.

Whale-louse (*Cyamus*), a genus of Crustacea, of the order Amphipoda and suborder Læmodipoda, parasitic on the skin of Cetaceans. The body is broad and flat, the abdomen is rudimentary, the appendages are short, stout, and for the most part clawed. By means of these claws they attach themselves to whales, sometimes almost covering the skin, so that the animal appears whitish. See PARASITIC ANIMALS.

Whalley, EDWARD, regicide. See GOFFE.

Wharfe, a river of the West Riding of Yorkshire, flowing 60 miles ESE. past Ilkley, Otley, and Tadcaster, to the Ouse near Otley.

Wharncliffe, LORD (1776–1845). James Archibald Stuart Wortley Mackenzie was educated at Eton, served in the army, and entered the House of Commons in 1797. As a Tory he opposed Catholic emancipation, but was one of the 'waverers' who helped to pass the Reform Bill, having been created a baron in 1826; he opposed Peel's Free Trade till his death. His name is remembered in connection with 'Wharncliffe Meetings'—meetings of public companies under a standing order of the House of Lords introduced by him. Under this 'Wharncliffe Order' proceedings for the modification of the powers of a company constituted by act of parliament cannot be instituted in the House of Lords till it is reported that a special meeting of the proprietors has been called under specified conditions of publicity.

Wharton, GRACE, the pen-name of Mrs Katherine Thomson (*née* Byerley; died 1862), authoress of Lives of Raleigh (1830), Sarah, Duchess of Marlborough (1838), and the Duke of Buckingham (3 vols. 1860), *Memoirs of the Jacobites* (3 vols. 1845–46), &c. With Philip Wharton, pen-name of her son, John Cockburn Thomson (died 1860), she published *Queens of Society* (2 vols. 1860) and *Wits and Beaux of Society* (2 vols. 1860).

Wharton, PHILIP WHARTON, DUKE OF, was the son of Thomas Wharton (1640–1714), who in 1706 was created Earl, and in 1714 Marquis, of Wharton—an eminent Whig statesman, the reputed author of *Lillibullero* (q.v.), and Lord-lieutenant of Ireland from 1708 until after the fall of the Godolphin administration in 1710. Macaulay says he was licentious and corrupt; but the faults of his Irish administration were largely redeemed by his appointment of Addison as Chief-secretary. Philip, born in December 1698, was educated at home by his father, who aimed at making him a great orator, a Whig in politics, and a Presbyterian in religion. In a boyish freak he contracted a Fleet marriage with the daughter of a Major-general Holmes. The shock is said to have killed both his parents. Wharton soon parted from his wife, and in 1716 went abroad with a French Huguenot tutor, to be brought up at Geneva. He contracted debts, spurned the restraints of his tutor, and running away to Avignon accepted, it is said, from the Old Pretender the title of Duke of Northumberland. He next visited Paris, and after various extravagances set out for Ireland, where, minor though he still was, he was allowed to take his seat in the House of Peers. He soon displayed such splendid abilities in debate, and supported the government with so much zeal, that he was, January 20, 1718, raised to the highest rank in the English peerage. He did not take his seat in the English House of Peers until 1720. Here he opposed with much warmth the government measure on the South Sea Bill, and the bill of pains and penalties against Bishop Atterbury. His affairs became hopelessly involved by his extravagance, so that, although he had succeeded to an estate of £16,000 a year, he was soon compelled to accept a yearly allowance of £1200 from his creditors. He set up a political paper, called the *True Briton* (74 numbers, 1723–24), and lost no occasion of speaking, as well as writing, against the ministry and the court. In 1724 he set out for Vienna, and then visited Madrid, where he was served with an order from the Privy Seal to return home. He treated the order with contempt, and afterwards went to Rome, and appeared openly at the court of the Pretender, from whom he accepted the Order of the

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Garter. He now assumed the title of Duke of Northumberland. In 1727 he fought with the Spaniards and against his countrymen at the siege of Gibraltar. This last mad act lost him his English title and estates, and led to his conviction under a bill of indictment for high-treason. He refused to make his submission to the government; and the rest of his life was passed in France and Spain, at one moment squandering his precarious supplies of money in drunkenness and luxury, and at another suffering the extremest poverty. He died in a miserable condition at a Bernardine convent in Catalonia, May 31, 1731. His brilliant talents and wasted life were sketched by Pope in his Moral Essays, in the lines beginning, 'Wharton, the scorn and wonder of our days.'

See the *Life and Writings of Philip, late Duke of Wharton* (2 vols. 1732), and *The Poetical Works of Philip, late Duke of Wharton, and of the Duke's Intimate Acquaintance* (2 vols. 1727), which, however, contains little that is even attributed to the duke.

Whately, RICHARD, Archbishop of Dublin, was born in London, 1st February 1787, the fourth son of Dr Joseph Whately of Nonsuch Park, Surrey, prebendary of Bristol, vicar of Widford, and lecturer at Gresham College. He was sent in due time to a private school at Bristol, whence in 1805 he passed to Oriel College, Oxford. He took a double second-class in 1808, gained the prize for the English essay in 1810, and the year after was elected a fellow of Oriel College. Copleston, Davison, Arnold, Keble, and Hawkins were already fellows, and Newman and Pusey were added later. In his *Apologia* Newman tells us that Whately opened his mind and taught him how to think and reason. In 1815 he became one of the college tutors, and about this time he wrote for the *Encyclopædia Metropolitana* what he afterwards expanded into his popular treatises on Logic (1826) and Rhetoric (1828). He had married in 1821, and accepted the living of Halesworth in Suffolk, and he had already given the world the first proof of his peculiar wit in *Historic Doubts relative to Napoleon Bonaparte* (1819)—an ingenious attempt to reduce to an absurdity Hume's position that no testimony is sufficient to prove a miracle. In 1822 he delivered the Bampton Lectures at Oxford, on the Use and Abuse of Party Feeling in Religion. In 1825 he was appointed Principal of St Alban's Hall, and in 1829 was appointed professor of Political Economy, but had only given a few lectures when in 1831 he was made Archbishop of Dublin.

A Liberal in religion and in politics, Whately may be counted one of the founders of the Broad Church party. Broadly rational in temper, sober and impartial, he was a resolute opponent of the Tractarian movement, but to the Evangelicals he seemed little better than a Latitudinarian, for he supported Catholic emancipation and concurrent endowment, and laboured long, but in vain, to establish a system of unsectarian religious instruction. Still worse, he was more than suspected of holding unsound views on predestination, future punishment, and the Sabbath question, and of being somewhat Sabellian on the nature and attributes of Christ. His caustic wit, abrupt manners, and fearless outspokenness brought him no little unpopularity, but the sterling honesty of his nature, his charity, justice, and sagacity gained him many friendships of unusual permanence and warmth, and conquered for him the respect of all men. One of the deepest things in his nature was a strong sense of duty, but for which indeed he would never have accepted the archbishopric, for he was within the truth when he termed the appointment 'a call to the helm of a crazy ship in a storm.' He died 8th October 1863.

Whately, though a strong logician, was devoid of the speculative faculty, hence his theological writings lack that kind of value which is the most enduring. But his acute intellect enlightened every subject that he touched, and his powers of exposition and illustration have hardly ever been surpassed. Of his books may be named *Essays on some of the Peculiarities of the Christian Religion* (1825), *Essays on some of the Difficulties in the Writings of St Paul* (1828), *Thoughts on the Sabbath* (1830), *Christian Evidences* (1837), *Essays on some of the Dangers to Christian Faith* (1839), *The Kingdom of Christ Delineated* (1841), and his edition of Bacon's Essays, with annotations not unworthy of the text (1856), as well as Paley's *Evidences* and *Moral Philosophy*. A list of his writings is appended to the New York edition of his *General View of Christianity* (1860). See the rambling *Memoirs* by W. J. Fitzpatrick (2 vols. 1864), and the more authoritative *Life and Correspondence* by Miss E. Jane Whately (2 vols. 1866).

Wheat, the most valuable of all the cereal grasses. The genus Triticum, of which the species are popularly known either as *Wheat* or *Wheat-grass*, is distinguished by a spike with many-flowered spikelets, without stalks, and seated one on each notch of the rachis, their sides directed to the rachis, which is zigzag; and two glumes, of which the lower is either awned or awnless; the outer palea of each floret having at the top a notch, in the centre of which is the terminal point, sometimes prolonged into an awn, or, in some species, with many florets tapering into an awn without a notch. (See the diagrams of a wheat spikelet and a wheat grain at GRASSES.) A number of species are found in Britain, of which *T. repens*, well known as Couch Grass (q.v.), is the most common; but the seeds of none of them are of any value. The native country of the cultivated wheat has generally been supposed to be the central part of Asia; it has been reported to have been seen growing wild in Mesopotamia, Kurdistan, and elsewhere, but the fact has not been proved. M. Fabre asserted, after a series of experiments in 1838–46, that the *Ægilops ovata*, a grass of the regions near the Mediterranean and of the west of Asia, had under his superintendence been transformed into wheat; but it is suspected that his grasses were hybridised by wheat. It is commonly believed, however, that the cultivated varieties of wheat are derived from some of the species of the genus Ægilops.

Wheat has been cultivated from the earliest ages, seems to have been cultivated in China 3000 years B.C., is found in prehistoric European lake-dwellings, and was a chief crop in ancient Egypt and Palestine, as it still is in all the temperate parts of Europe, Asia, and Africa. It is cultivated to a considerable extent in the north of India. In North America it is very extensively cultivated, and many parts of the United States and British provinces are admirably adapted to it. Wide regions of South America are equally suitable, and wheat of the finest quality is produced in Australia. In the torrid zone wheat does not succeed, except in elevated situations; but it nowhere succeeds better than in subtropical regions, although it is a hardy plant, and when covered by snow endures even very severe winters in the north of Europe. For its successful cultivation, however, it requires a mean temperature of at least 55° F. for three or four months of the year. It is an annual plant, and its capacity of enduring the cold of winter is of importance only in connection with the advantage to be derived from sowing in autumn, so as to have it more forward in spring. Its cultivation does not extend so far north as that of barley or oats, or even of rye. In Europe its northern limit is about 60° lat. The quality of the grain varies much in different soils and climates, and particular varieties are also

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distinguished by difference of quality as well as by external characters. The wheat of the eastern parts of Britain, where the climate is comparatively dry, is superior to that of the western parts, where the sky is more cloudy and the climate more humid, although the crops in the west are not less luxuriant.

Common Wheat (*T. vulgare*, or *sativum*) grows to a height generally of 3 or 4 feet, and has ears or spikes generally 3 or 4 inches long; the spike 4-cornered, the spikelets about 4-flowered; the palese ventricose, ovate, truncate, mucronate or awned, compressed under the point, rounded at the back, the grain free. In consequence of long cultivation, in a great variety of climates, the cultivated varieties of wheat are very numerous. New varieties are continually coming into notice; and many are in high estimation in particular districts, although little known beyond them. Some botanists have attempted to distinguish species among them, appropriating the name *T. æstivum* to the awnless kinds, and *T. hybernum* to the awned; but intermediate forms are very numerous, and the length or shortness of the awn seems to depend upon accidental circumstances. Nor do the awnless or beardless kinds perfectly correspond with the Summer Wheat of farmers, preferred for sowing in spring with a view to a crop in the same season, and the awned or bearded kinds to the Winter Wheat, sown in autumn; as some of the hardy varieties of Winter Wheat are awnless, and some of those usually sown in spring are bearded. Besides being classified as Bearded and Beardless, the varieties in cultivation are also distinguished, according to the colour of the grain, as *White* and *Red* wheats. Some having the ears covered with a short soft down are known as *Woolly* wheats. There are also differences in the length and compactness of the spike, and in the size and form of the grain, which is more rounded in some, and more elongated in others. A number of varieties having the spike very compact or square have been sometimes classed together under the name of *T. compactum*, and the distinction is very obvious and permanent, although there is no reason for regarding it as characterising a distinct species. Akin to this is the Mummy Wheat (*T. compositum*), in which the spike is branched, and which used to be described on totally insufficient evidence as having been produced from seeds found in mummy-cases in Egypt. Mummy wheat has been grown in England of which the ears have had 10 or 11 branches, and 150 grains have been found in one ear; whilst 60 ears have been produced by a single seed. Notwithstanding these apparent advantages, however, this variety does not serve the purposes of the farmer so well as some others. In another group of varieties with compact ears (*T. turgidum* of some botanists) the glumes are remarkably tumid, and always awned. Polish Wheat (*T. polonicum*) is a well-marked, coarse type. Spelt (*T. spelta*) is probably only a race of *T. sativum;* it was cultivated by the Swiss lake-dwellers and the ancient Romans, and is still grown in the mountainous parts of Europe and elsewhere.

The red varieties of wheat are generally more hardy than the white; the grain is inferior in quality, and yields less flour, but these disadvantages are more than counterbalanced in many soils and situations by the greater productiveness of the crop. Red wheats are therefore preferred for comparatively poor soils, but the white kinds are generally cultivated wherever the soil and climate are suitable. The varieties with long straw yield the best crops in dry seasons, but the short-strawed kinds are best when the season is wet. Wheat is particularly suited to clay soils and rich heavy loams; but with good farming excellent crops are produced even on light sandy or gravelly and on chalky soils. Where the climate is moist a light dry soil is most suitable; soft deep soils being productive chiefly of straw. The land intended for wheat must, at least in Britain, be in a high state of cultivation and fertility. Wheat is commonly sown after green crops, beans, or bare fallow, and often after grass or clover. It may be sown, at least in autumn or the beginning of winter, when the ground is so saturated with moisture that any other kind of grain would be almost sure to perish. It is either sown broadcast or in drills, and the practice of drilling becomes more and more prevalent, on account both of the saving of seed and of the superiority of the crops produced. The land prepared for wheat is very often manured with farmyard manure or artificial manures.

The relative proportions of straw and grain differ very much in different varieties of wheat, and according to differences of soil, climate, and season. The proportion of the weight of grain to that of the whole plant when dried so as to be ready for stacking varies from 20 to 47 per cent. The composition of the grain itself varies considerably as to the proportions of starch, gluten, &c. which it contains. American wheats are drier than European wheats in the proportion of 10·27 to 14 per cent. of moisture; the carbo-hydrates (starch, &c.) average 72 per cent. instead of 68 per cent., as in English wheat. American wheat has a small grain, very free from fibre (bran), very rich in carbo-hydrates and oil, but deficient in albuminoids —not necessarily the best indication of value. European wheat has usually 13 per cent. of albuminoids (gluten, &c.), and sometimes 19·5 per cent. American wheats have an average of 11·95 per cent., and those from the Pacific coast only 8·6 per cent. Australian and Egyptian wheats, both remarkably fine, are also somewhat deficient in albuminoids. 100 parts of the grain of European wheat, dried in the ordinary manner, have yielded water, 14·83; gluten, 19·64; albumen, 0·95; starch, 45·99; gum, 1·52; sugar, 1·50; oil, 0·87; vegetable fibre, 12·34; ash, 2·36—total, 100·00. Wheat ash is rich in phosphoric acid, magnesia, and potash.

The value of wheat depends mainly on the quantity of fine flour which it yields; the best wheat yielding 76–80 per cent., sometimes even 86 per cent. of fine flour, whereas inferior kinds seldom yield more than 68 per cent., and sometimes only 54–56 per cent. In general the smoother and thinner the grain is in skin the greater is the produce of fine flour. The greater part of the husk of wheat is separated from the flour by the miller, and is known as *bran*. That portion of the bran which is more finely divided than the rest receives the name of *sharps* or *pollard*. See the articles BRAN, FOOD, BREAD.

Wheat being the most esteemed of all the cereals, particularly for the making of bread, the increase of its cultivation and use has marked the progress of agriculture and of wealth in many countries. It is only in comparatively recent times that bread made of wheat has become a common article of food among the labouring classes in Britain. In the 8th century the monks of the abbey of Bury St Edmunds ate barley-bread, because the income of the abbey would not admit of their using wheaten bread regularly. At a later period wheat was largely used, at least in the southern parts of England, for a short time after harvest, but the supply was soon exhausted, and recourse was again had to inferior kinds of food. From Walter of Henley's *Husbandry* (ed. by Eliz. Lamond, 1892) we learn that in the early 13th century wheat was expected to produce only five-

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fold (as compared with say fourteen-fold now). Down to the end of the 17th century wheaten bread was a principal article of food only among the more wealthy; and the servants in their houses were still furnished with oats, barley, and rye. In the northern parts of England, as well as in Scotland, the use of wheaten bread was comparatively rare even at the middle of the 18th century. 'So small was the quantity of wheat used in the county of Cumberland,' says Eden, in his *History of the Poor* (1797), 'that it was only a rich family that used a peck of wheat in the course of the year, and that was at Christmas. The usual treat for a stranger was a thick oat-cake (called *haver-bannock*) and butter. An old labourer of eighty-five remarks that when he was a boy he was at Carlisle market with his father, and wishing to indulge himself with a penny loaf made of wheat-flour, he searched for it for some time, but could not procure a piece of wheaten bread at any shop in the town.' At the period of the Revolution, 1689, the quantity of wheat grown in England was estimated at about 14,000,000 bushels, or about three bushels to each of the population, which was then under five millions. In 1828 about 100,000,000 bushels were produced, or about seven bushels to each of the population, then under fifteen millions. Between 1799 and 1800 the price of wheat in England rose from 69s. per quarter to 113s.; in 1801 it was 119s.; and next year sank to 69s., rising again to 106s. in 1810, and 126s. in 1812. Since 1817 (when it was 86s.) it has greatly fallen; the average price for the first time touching as low a point as 30s. in 1886, and 28s. in 1892. For the varying price and the controversies therewith connected, see CORN LAWS.

In 1891 there were 2,192,393 acres under wheat in England, 61,590 acres in Wales, 53,294 acres in Scotland, and 80,870 acres in Ireland. The estimated produce of this, in bushels of 60 lb. each, was as follows: England, 68,694,456 bushels; Wales, 1,461,740 bushels; Scotland, 1,971,067 bushels; and Ireland, 2,615,437 bushels—giving a total of 74,742,700 bushels, of 60 lb. each, for the United Kingdom. To supplement the home production of wheat no less than 123,784,192 bushels of wheat, besides flour equal to other 41,830,008 bushels, were imported into the United Kingdom in 1891. The total imports of wheat for 1891 were thus equal to 165,614,200 bushels, giving a wheat supply for that year of 240,356,900 bushels, or a little over 6 bushels per head of the population. It will be observed that the quantity of wheat now imported into the United Kingdom is more than double that produced at home. Year by year the imports increase and the home production declines. Through the pressure of foreign competition and general trade and agricultural depression at home, the price of wheat fell from an average of 58s. 8d. per quarter in 1873 to an average of 29s. 9d. per quarter in 1889. As the result of this fall in price the area under wheat in the United Kingdom decreased by fully one-third in the twenty years 1871 to 1891. Between 1880 and 1890 the imports of wheat were more than doubled. The percentages of the wheat supply which came from the various foreign countries in 1891 were as follows: United States of America, 36·49; Russia, 21·95; India, about 10·00; Canada, 4·79; Turkey, 2·28; Egypt, 1·41; Germany, 1·08; France, 0·19; other countries (including Australasia, Chili, Argentine Republic, the Danubian Provinces, &c.), 21·81 per cent. The proportion of the imports of wheat from Germany, Egypt, and France has in recent years fallen off considerably, while that from Russia continues to increase. British India now contributes a substantial proportion of the wheat supply of the United Kingdom; but the United States and Russia seem likely to maintain the lead. There has lately been much discussion as to the probable future of wheat cultivation in the United Kingdom. With prices averaging 30s. to 35s. per quarter—nearly 20s. per quarter less than prior to 1879—wheat cannot now be grown at a profit in many parts where it was formerly cultivated with success. Indeed, wheat cultivation is being persevered with only in soils and situations specially favourable to it. Through the superior systems of farming pursued the produce of wheat per acre in the United Kingdom is greater than in any other country, but the cost of production is necessarily much higher than on the rich virgin soils of comparatively new countries.

The Spaniards introduced wheat-culture into Mexico about 1530; wheat was first planted in New England in 1602, and in Virginia in 1611. The growth of the acreage in the United States has been phenomenal, especially since the development of the central states in the upper Mississippi valley, and again on the Pacific coast. In California the crop in 1850 was but 17,200 bushels, whereas in 1890 it was 29,121,000. In the same year Minnesota produced 38,356,000 bushels, Ohio nearly 30,000,000, Kansas over 28,000,000, Indiana nearly 28,000,000, Michigan over 20,000,000, the two Dakotas 40,411,000, Iowa nearly 20,000,000, followed by Illinois, Missouri, Pennsylvania, and Nebraska. The total wheat crop of the United States was close on 400,000,000 in 1890, and in 1891 about 545,000,000. Between 1880 and 1890 the total exports of wheat and wheat-flour have fluctuated between 186,321,000 (1880–87) and 88,600,000 (1888–89). The acreage in the United States may be put at 38,123,000 acres, as against 28,947,000 in Russia, 17,209,000 in France, and 2,193,000 in the United Kingdom, and 3,663,000 in Australasia. In an average year France, Germany, and Spain just about supply their own needs. South America now exports a little.

The principal diseases to which wheat is subject, some of which are productive of great loss to the farmer, are either owing to or connected with the presence of parasitic fungi. The chief of these diseases, noticed separately, are Bunt, Mildew, Rust, and Smut. Wheat is also liable to injury from several insect pests, such as Wireworms, and various other Corn Insects (q.v.). The Hessian Fly is separately discussed. *Ear-cockles* (also called 'purples' or 'peppercorn') is a disease in wheat associated with the abundant presence of a Threadworm (q.v.) parasite. This minute animal has received various names—e.g. *Vibrio tritici*, *Anguillula tritici*, but is now usually called *Tylenchus scandens*. An infested or mildewed ear of wheat contains some ten larvæ in each grain; these lie quiescent, and can so remain for many years, surviving what appears to be very thorough desiccation. If the grain be sown the larvæ become active, and migrate into the soil. Thence they return to the young wheat-plants, into which they insinuate themselves, and may there spend the winter. With the growth of the plant the threadworms ascend the stem and finally pass into the ears. There they become sexually mature, and the females deposit eggs. After that the parent forms apparently die, but the eggs develop into larvæ.

See AGRICULTURE, and books there cited; CEREALIA; CULTIVATED PLANTS; GRASSES; STRAW; PLANTS (DISEASES OF); Vilmorin, *Les Blés Meilleurs* (1881); and on Ear-cockles, Davaine, *Recherches sur l'Anguillule du Blé* (1857), and the researches of Ritzema-Bos in the *Biologisches Centralblatt* (1888).

Wheat-ear (*Saxicola œnanthe*), a bird of the Chat genus (q.v.). It is one of the first spring visitors to the British Islands, and although gener-

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ally and widely diffused it is still a local bird in most places. In the south and west of England it is somewhat rare; in the north it is commoner; while in the Orkneys and Shetland and the Outer Hebrides it is one of the commonest and most abundant birds. It breeds throughout central and northern Europe, and in southern Europe where the mountains are high enough for pine and birch; westwards to Iceland, Greenland, and Labrador; eastwards to Persia, Syria, North Siberia, and Alaska. Its winter migrations extend southwards to North and West Africa, Mongolia, Northern India, Persia, and the Bermudas and Colorado. It nests about the middle of April, and produces two broods

Wheat-ear (*Saxicola œnanthe*).

of from five to seven young in a season. It feeds on insects, grubs, worms, small spiders, and small snails. It is a good mimic, and the song of the male is rather pretty. The most striking character of the plumage is the white colour of the rump, upper tail-coverts and base of the tail, whence the name *white rump*, by which the bird is known in every European language, and of an Anglo-Saxon equivalent of which 'wheat-ear' is believed to be a modern corruption—though it is thought by some to be for *whitterer*, meaning *twitterer*. The wheat-ear migrates at night, and in autumn when the birds are fat and of rich flavour they used to be snared in great numbers by shepherds, and sent to the London and other markets. Of late years they have become much less plentiful, owing probably to the destruction of their favourite breeding-grounds by cultivation. The wheat-ear is also known by the names fallow-finch, white-tail, stone-chacker, chack-bird, &c. They arrive in Britain in two divisions, the first, in March, consisting of poor, emaciated birds, the second, a month later, of plump ones. The Isabelline Wheat-ear (*S. isabellina*) has been found only once in Britain. It differs from the common wheat-ear in being larger, more tawny, in having a shorter tail with more black in it, and the under wing much lighter. The Black-throated Wheat-ear (*S. stapazina*) and the Desert Wheat-ear (*S. deserti*) have been found in Britain only once or twice.

Wheat-fly. See CORN INSECTS, HESSIAN FLY.

Wheaton, HENRY, American jurist, was born at Providence, Rhode Island, November 27, 1785, graduated at Brown University in 1802, and three years later was admitted to the bar. From 1812 to 1815 he edited the *National Advocate* in New York, then for four years was a justice of the Marine Court there, and from 1816 to 1827 reporter for the United States Supreme Court (*Reports*, 12 vols. 1826–27; also *Digest of Decisions from 1789 to 1820*, 1820–29). In 1827–35 he was *chargé d'affaires* at Copenhagen, and in 1835–46 minister at Berlin. In 1836 he published his most important work, the *Elements of International Law*, which has seen many editions, under various editors, and been several times translated. Other works include a Life of William Pinkney, Histories of the Northmen and of the Law of Nations, &c. He died at Dorchester, Massachusetts, March 11, 1848.

Wheatstone, SIR CHARLES, scientist, electrician, and the pioneer of telegraphy, was born in the vicinity of Gloucester, in February 1802. A precocious child, he could read at four years of age, and at the private school which he afterwards attended he showed a strong liking for mathematics and physics. In 1806 his father, who was a musical instrument maker, removed to London, and began business. In 1816 young Wheatstone was placed with his uncle, a music-seller, but his father removed him when he saw that he was more inclined for study. Endowed with remarkable ingenuity, he produced numerous models and apparatus to illustrate the phenomena of acoustics and light, and also exhibited some clever musical instruments. For a period of six years (1823–29) Wheatstone was back at the music-selling business. A paper of his on *New Experiments in Sound* was translated into French and German, and previous to 1833 he had published five papers connected with this subject. In 1831 he read a paper on *Transmission of Sound through Solids* before the Royal Institution, and henceforward he became known as an earnest and hard-working man of science. Although he could describe and explain his inventions clearly enough, he was shy and sensitive, and failed as a lecturer, many of his investigations being made known by Faraday at the Royal Institution.

In 1834 he was appointed professor of Experimental Philosophy at King's College. He invented a rotating mirror, by means of which he determined the time the electric impulse took to travel along a ¼ mile of copper wire. His future studies were now in the line of sound and electricity. In 1835 he made a speaking-machine with an india-rubber mouth, which uttered such simple words as 'rum,' 'mamma,' &c. Wheatstone and W. F. Cooke in 1837 took out a patent 'for improvements in giving signals and sounding alarums in distant places by means of electric currents transmitted through metallic circuits.' From this instrument, which had five needles, has grown that system of electric telegraphs which now ramifies over the length and breadth of the United Kingdom. Between 1836–40 his mind was also occupied with the problem of submarine telegraphy (see TELEGRAPH).

In a paper on Binocular Vision laid before the Royal Society in 1838 he explained the principle of the Stereoscope (q.v.), an instrument of his invention; in 1840 he showed that, by means of electro-magnetism, a number of clocks far apart might be kept going with absolute exactitude from one central clock (see Vol. IV. p. 253); and in 1843 he brought out his new instruments and processes for determining the constants of a voltaic series. Wheatstone was unrivalled in reading secret cipher; and his own cryptograph is said to have never been deciphered. There were also his automatic telegraph in two forms; his telegraph thermometer and barometer; a machine for the conversion of dynamical into electrical force without the use of permanent magnets; and an apparatus for conveying instructions to engineers and steersmen on board large steam-vessels. The method of measuring electrical resistance known as Wheatstone's Bridge (brought into notice, though not invented by him) is explained at ELECTRICITY, Vol. IV. p. 268. Nor should we omit to mention his Concertina (q.v.) and polar clock. He was a vice-president of the Royal Society, and received its royal medal in 1840 and 1843, and the Copley medal in 1868. He was

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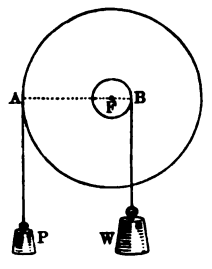
knighted in 1868, was made LL.D. of Edinburgh in 1869, and died at Paris, October 19, 1875.

Most of Wheatstone's investigations are described in *Philosophical Transactions*, *Proceedings of the Royal Society*, and British Association *Reports*. His *Scientific Papers* (1879) are among the publications of the Physical Society, London. See *Proc. Inst. C. E.* (xlvii.), and *Proc. Roy. Soc.* (xxiv. 47).

Wheel, BREAKING ON THE, a very barbarous mode of inflicting the punishment of death, formerly in use in France and Germany, where the criminal was placed on a wheel, with his arms and legs extended along the spokes, and the wheel being turned round, the executioner fractured his limbs by successive blows with an iron bar, which were repeated till death ensued. There was considerable variety in the mode in which this punishment was inflicted, at different times and in different places. By way of terminating sooner the sufferings of the victim, the executioner was sometimes permitted to deal two or three severe blows on the chest or stomach, known as *coups de grâce;* and occasionally, in France at least, the sentence contained a provision that the criminal was to be strangled after the first or second blow. Mercy of this kind was, however, not always allowed to be shown to the victims of the wheel: when Patkul, the envoy of Peter the Great, was put to death on the wheel by order of Charles XII. of Sweden, it is said that the officer in command of the guard was cashiered by the Swedish king in consequence of having allowed the head to be struck off before life was extinct in the mangled limbs. The punishment of the wheel was abolished in France at the Revolution—Jean Calas (q.v.) had suffered by this means; in Germany it was inflicted within the 19th century on persons convicted of treason and parricide. The murderer at the wife's instigation of John Kincaid of Warriston was broken on the *row* or wheel at Edinburgh in 1604, as also two of the slayers of the Regent Lennox.

Wheel and Axle is a modification of the Lever (q.v.). Its most primitive form is a cylindrical axle, on which a wheel, concentric with the axle, is firmly fastened. When employed for raising heavy weights, the weight is attached to a rope which is wound round the axle, and the power is applied either to a rope wound round the grooved rim of the wheel, or to a handle fixed at right angles to the wheel's rim, or to its practical equivalent, an ordinary winch. The accompanying figure exhibits a transverse section of one of the commoner forms, and shows that the machine is neither more nor less than a lever, whose extremities are the points at which the power and weight act. These do not act at *invariable* points in the circumferences of the circles whose radii are FA and FB. They act along the cords wound round the circles and therefore at the points A and B at which *for the moment* the cords are tangents to the circles. Thus the imaginary simple lever, AB, is preserved unaltered in position and magnitude. The conditions of equilibrium are that P × AF = W × FB, or, since the circumferences of circles are proportional to their radii, that P : W :: circumference of axle : circumference of wheel. The *capstan* and *windlass* are simple and common examples of this mechanical power, and combinations of toothed-wheels, or of wheels from one to another of which motion is communicated by an endless band, are compound illustrations of the same.—For wheels and wheel work generally, see works on mechanical engineering, like Rankine's *Applied Mechanics*. There are treatises on toothed wheels by Camus (1806; new ed. 1868) and Robinson (1876). For water-wheels, see WATER (section on Water-power); for the potter's wheel, see POTTERY.



Wheel-animalcule. See ROTATORIA.

Wheeling, the principal city of West Virginia, a port of entry, and capital of Ohio county, on the left bank of the Ohio River, and at the mouth of Wheeling Creek, at the foot of steep hills, 67 miles by rail and 92 by river SW. of Pittsburgh. The National Road here crosses the Ohio, over which is a wire suspension bridge, with a span of 1010 feet; and a fine railway bridge connects the city with Bellaire, Ohio. For ten years (1875–85) Wheeling was the state capital. It contains a fine court-house, a custom-house, and a female college. The hills around the city are full of bituminous coal. The principal manufactories are blast-furnaces, foundries and forges, nail-factories, glass-works, woollen, flour, and paper mills, &c. Pop. (1880) 30,737; (1890) 35,013.

Wheel-lock. See FIREARMS, Vol. IV. p. 638.

Whelk, a popular name for a number of marine Gasteropods, and especially applied to species of Buccinum common on the coasts of northern seas. Very familiar is *Buccinum undatum*, the 'common whelk,' often dredged for bait or as food for the poor. It occurs from low-water to a depth of about 140 fathoms, and burrows in the sand for bivalves, such as Mya, on which it feeds. Its shell is sometimes 3 inches in length, is grayish or brownish-white in colour, and has a few ridged whorls, a wide aperture, and a short notch or canal for the respiratory siphon. The animal has a strong radula with which it can bore through shells, a markedly protrusible mouth, a long protrusible siphon through which water enters the gill-chamber, and a plate-like horny operculum borne by the foot.

Common Whelk (*Buccinum undatum*).

The notch at the mouth of the shell, in which the siphon lies, is characteristic of most carnivorous Gasteropods. The egg-capsules, which are aggregated in balls, are often seen attached to the rocks or drifted on to the sand. Each capsule contains a large number of eggs, but only a few of the embryos survive, as the result, it is said, of juvenile cannibalism. In Scotland *Buccinum undatum* is often called the Buckie, but the 'roaring buckie' is *Fusus antiquus*, a related form, which has a much longer siphon canal. The name 'dog-whelk,' or 'dog-periwinkle,' is given to *Purpura lapillus*, a small form very common among the rocks and very destructive to mussel-beds. It secretes a white fluid, which on exposure to air becomes a brilliant blue. Its egg-capsules are also common on the rocks, and look like little vases standing erect in clusters. Another common 'dog-whelk' is *Nassa reticulata*, abundant on the low-water rocks.

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All these must be distinguished from the most edible whelk—the Periwinkle (*Littorina littorea*), a vegetarian Gasteropod not nearly related to the above. For anatomy, see GASTEROPODA.—*Whelk* is also an old name for Acne (q.v.).

Whetstones, or HONES, are used for sharpening cutting instruments of all kinds. For scythe and other large steel blades stones of a coarse texture or grain are used, but for putting a fine edge on chisels, razors, penknives, and engravers' tools fine-grained hones are employed. There are few known localities for such as have suitable fineness, hardness, uniformity of texture, and 'bite' combined in such a way as to form a first-rate hone. The three most favourably known are the *Turkish hone or oil-stone* from Asia Minor, composed of about 73 per cent. of silica intimately mixed with calcite; the *Arkansas hone*, consisting of 98 per cent. of silica; and the *German razor hone*, from near Ratisbon. The *Washita hone*, found in the same state and county, is cheaper and better suited for ordinary tools than the Arkansas stone. In Great Britain the best *hone slates*, as they are sometimes termed, are the *Charnley Forest stone* (Leicestershire); the *Welsh oil-stone*, or *Idwal stone;* the *cutler's greenstone*, also a Welsh rock; and the *Water-of-Ayr stone*. This last, a fine-grained argillaceous rock, rather softer than most hone-stones, is used for numerous other purposes besides sharpening tools. Several kinds of hone-stones are used for polishing hard surfaces—that of silver, for instance. *Hone-stone*, or *Novaculite*, is a very hard, fine-grained siliceous variety of clay-slate. Any hardish slate of smooth uniform texture will make a fine hone, and few countries are without some sharply gritted rock from which serviceable whetstones for sharpening large cutting blades or edge-tools can be made. There are instances of 'whetstones' made of wood with the pores filled up with some hard substance.

Whewell, WILLIAM, D.D., was born on 24th May 1794 at Lancaster. His father intended him for his own trade—that of a joiner; but the boy, having excelled at school in mathematics, went up in 1812 to Cambridge as an exhibitioner of Trinity College, and, after gaining the Chancellor's medal for the English prize poem in 1814, graduated in 1816 as second wrangler and second Smith's prizeman. He became a fellow and tutor of Trinity, where also for many years he acted as a successful 'coach,' or private tutor; in 1820 was elected an F.R.S.; between 1828 and 1832 was professor of Mineralogy in Cambridge, and between 1838 and 1855 professor of Moral Theology. In 1841 he succeeded Dr Wordsworth as Master of Trinity, and in the same year was President of the British Association at its meeting at Plymouth. He was also for a time President of the Geological Society. In 1855 he became Vice-chancellor of the university of Cambridge. He died at Trinity on 6th March 1866—the result of a fall from his horse. A large, strong, erect man, with a red face and a loud voice, Whewell was an effective preacher and lecturer, though in both characters wanting in that something which wins and rivets the hearer. He was accused of being arrogant; and one remembers the well-known Chinese music story, and Sydney Smith's saying, 'Science is his forte and omniscience his foible.' His knowledge was indeed encyclopædic, with all the defects of an encyclopædia; his works included *Astronomy and General Physics considered in Reference to Natural Theology* (Bridgewater Treatise, 1833), *History of the Inductive Sciences* (3 vols. 1837), *The Philosophy of the Inductive Sciences* (2 vols. 1840), *The Elements of Morality, including Polity* (1855), *The Plurality of Worlds* (1853), and other writings on the tides, electricity, magnetism, heat, German church architecture, the History of Moral Philosophy in England, &c., besides translations of Goethe's *Hermann and Dorothea*, Auerbach's *Professor's Wife*, Grotius' *Rights of Peace and War*, and Plato.

See Todhunter's *Whewell: an Account of his Writings* (1876), and the Life by Mrs Stair Douglas (1881).

Whey. See MILK.

Whichcote, BENJAMIN, one of the Cambridge Platonists, was born of a good Shropshire family, March 11, 1609, entered Emanuel College, Cambridge, in 1626, and became a fellow in 1633. For ten years a college tutor, in 1643 he took the college living of North Cadbury in Somersetshire, afterwards held by Cudworth, but a year later became Provost of King's College, Cambridge, in the room of the ejected Dr Collins. Yet he was far from being a Puritan, and he protected the interest of the provost and fellows with the most scrupulous care. And his influence upon the university was great. Already as a fellow he had been the tutor of Wallis, Culvervel, and John Smith, who says of his master, 'I lived upon him.' At the Restoration he lost his provostship, but held livings first at St Anne's, Blackfriars, together with Milton in Cambridgeshire, and finally the vicarage of St Lawrence Jewry, where he died in May 1683. He himself published nothing; and four volumes of *Discourses* (i.–iii., edited by Dr Jeffery, 1701; iv., by Dr Samuel Clarke, 1707), and *Moral and Religious Aphorisms*, collected from his MSS. by Jeffery (1703; new ed. by Dr Salter, containing his correspondence with Dr Tuckney, 1753), notable for vigour and point, are all his work. Whichcote was one of those teachers whose personality was greater than his intellectual productiveness, and his real significance must be sought in the impulse he gave to philosophical theology as seen in his own pupils and contemporaries—in Smith, More, and Cudworth, as well as Tillotson, Patrick, and Burnet.

See Principal Tulloch's *Rational Theology* (vol. ii. 1872), Bishop Westcott's *Essays in the History of Religious Thought* (1891), and vol. iii. of Bass Mullinger's *History of the University of Cambridge* (1892). The Earl of Shaftesbury edited a selection of his sermons in 1698, which was reprinted at Edinburgh by Principal Wishart in 1742. The best edition of his complete works is by Drs Campbell and Gerard (4 vols. Aberdeen, 1751).

Whidah. See WHYDAH.

Whig, a shortened form of *whiggamor*, a nickname of the peasantry of the Western Lowlands of Scotland, derived not from *whig*, 'sour whey,' but from *whiggam*, a sound used by them in driving their horses. The 'Whigamore Raid' is the name given to the march of 7000 western Covenanters on Edinburgh (1648), which sealed Charles I.'s doom; and we find the same term applied to the Covenanters of Bothwell Bridge (1679). Thence the name Whig came to be fastened first on the whole Presbyterian zealots of Scotland, and afterwards on those English politicians who showed a disposition to oppose the court, and treat Protestant nonconformists with leniency. Coming into use about 1679–80, Whig and Tory (q.v.) immediately became familiar words, and have been retained as designations of the two opposite political parties. These, however, since 1830 have been renamed Liberals and Conservatives, Whig being restricted to the more conservative members of the Liberal party, as opposed to Radical (q.v.).

In United States history it denotes those who in the colonial and revolutionary periods were opposed to the British rule; and also it is the name adopted in 1834 by the survivors of the old National Republican party, after its overwhelming defeat by Jackson in 1832. Jackson's bold action

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in dismissing members of his cabinet, and his relentless war upon the United States Bank, made him in their eyes a tyrant little less hateful than George III., and the old name of Whig was chosen as expressive of their revolt against one-man power. Webster, Clay, and other National Republicans and old Federalists readily accepted the name, under which they were defeated in 1836, and in 1840 won their first great victory in the return of President Harrison. The party died in 1852, slain by the hands of its own dissatisfied members.

Whimbrel (*Numenius phæopus*), a bird of the family Scolopacidæ, allied to the curlew and closely resembling it in form, plumage, and habits, but smaller in size and having a much shorter bill. The Whimbrel—or Titterel, as it is often called—

Whimbrel (*Numenius phæopus*).

is only a summer visitor to Great Britain, but it breeds in small and rapidly decreasing numbers in the Orkney and Shetland Islands. The adult bird measures about 17 inches in length, the female being rather larger than the male. See CURLEW.

Whin. See FURZE.

Whin-chat (*Saxicola rubetra;* see CHAT), a bird very similar in appearance, especially when it assumes its duller autumn plumage, to the Stone-chat (q.v.). It breeds in many parts of northern and central Europe, as far south as Sicily; but is chiefly a migrant to Mediterranean countries, and winters southwards in Africa as far as the Fanti country and Abyssinia, eastwards in Arabia, Asia Minor, and Northern India. To

Whin-chat (*Saxicola rubetra*).

the British Islands it is a summer visitor, arriving in the middle of April, and reaching its northern quarters about the beginning of May. In Ireland it is rare. It feeds on beetles, insects, worms, and small molluscs. Its song is pleasant. It frequents heaths and commons, whence its name of 'Grass-chat;' and it roosts on the ground. The female is duller in colour than the male.

Whinstone, a popular name in Scotland for any hard and compact kind of stone, as contra-distinguished to sandstone or freestone and rocks of slaty structure. Thus in Scotland it is the common appellation of such rocks as basalt and its varieties, porphyrite, greywacke, &c., whilst in some districts it is applied to granite.

Whipping. See FLOGGING, KNOUT. Of innumerable kinds of whips—coach-whips, horse-whips, dog-whips, &c.—the types vary from a slender pliant switch all in one piece to a short stiff handled whip with a very long lash. The stock-whip of Australia, a riding whip, has a short handle of 2 feet, with a lash 15 feet. The wagon-whip of South Africa comprises a long, tapering bamboo of 14 or 15 feet, and a lash about as long; it is a two-handed whip, wielded usually by a man on foot.

Whip-poor-will (*Caprimulgus* or *Antrostomus vociferus*), a species of Goatsucker (q.v.), a native of North America, common in the eastern parts of the United States, and often imagined to be identical with another goatsucker, the Night-hawk (*Chordeiles popetue*). It receives its popular name from the fancied resemblance of its notes to the words *Whip poor Will.* It is about 10 inches long, the plumage very like that of the European goatsucker, much mottled and indistinctly marked with small transverse bands, the top of the head streaked with black, a narrow white collar on the throat. The bristles at the base of the bill are very stiff, and more than an inch long, and the tail is rounded, the lateral feathers largely white in the male. This bird is seldom seen during the day, but seeks its food by night, catching moths, beetles, and other insects on the wing. Its flight is near the ground, zigzag, and noiseless. Its notes are heard only during the night, and are clear and loud, so that when a few of these birds are close at hand the noise is such that those unaccustomed to it cannot sleep. In the more southern parts of the United States the whip-poor-will is replaced by a larger species, the Chuck-Will's-widow (*C.* or *A. carolinensis*), and which, like the whip-poor-will, takes its name from its cry, and to the west by a smaller one (*C.* or *A. Nuttalli*) having a somewhat similar cry to the whip-poor-will, but feebler. See Baird, Brewer, and Ridgeway's *North American Birds* (Boston, 1874).

Whip-snake, a name given in North America to various species of the genus Masticophis (especially *M. flagelliformis*, the coach-whip snake, 4 to 5 feet long, slender, and harmless); as also to species of Philodryas, of Passerita, &c.

Whirlpool, a circular current in a river or sea, produced by opposing tides, winds, or currents. It is a phenomenon of rare occurrence on a large scale, but illustrations in miniature may be noticed in the eddies formed in a river by means of obstacles or deflections. The two celebrated sea-whirlpools Charybdis (see SCYLLA) and Maelström (q.v.) are now known to be merely 'chopping seas,' caused by the wind acting obliquely on a rapid current setting steadily in one direction while the tide is flowing, and in the opposite direction when it is ebbing. During calm weather neither of these so-called whirlpools is dangerous for large ships, but when the current and the wind are strongly in opposition the broken swell is so violent and extensive in the Maelström as to founder large ships, or drive them against the rocks. Though in neither of these two cases, formerly so much dreaded, is there any vortical action, instances of such action do actually occur in various localities, as in the whirlpool of Corrievrekin (q.v.), and in some eddies produced by opposing winds and currents among the Orkney Islands.

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Whirlwinds and Waterspouts. Whirlwinds differ essentially in nature from the storms of wind described in the articles STORMS. Individual whirlwinds seldom continue longer than a minute at any place, and sometimes only a few seconds; their breadth varies from a few yards to nearly a quarter of a mile, and during their short continuance, the changes of the wind are sudden and violent. If a fall of the barometer is recorded it is virtually instantaneous, and is immediately followed by a rise equally as sudden as the previous fall. The direction of the eddy of the whirlwinds, especially when the diameter is very small, differs from the rotation of winds in a storm in that it may take place either way—right to left, or left to right—according to the direction of the stronger of the two winds which give rise to the whirlwind. Whirlwinds often originate within the tropics during the hot season, especially in flat sandy deserts; since these becoming unequally heated by the sun give rise to ascending columns of heated air and descending currents of cooler air contiguous to them, which result in eddies that draw up with them large clouds of dust; and the whole is borne forward by the wind that may happen to be blowing at the time. This is the origin of the *dust whirlwinds* of India, locally known as 'dust devils,' which have been admirably described and illustrated by P. F. H. Baddeley. These dust-storms are frequent in dry, hot regions; and in the case of the *Simoom* (q.v.), which may be regarded as a succession of such whirlwinds, they appear on a scale of the most appalling grandeur.

Extensive fires, such as the burning of the prairie in America and the bush in Australia, and volcanic eruptions also cause whirlwinds by the ascending and descending currents of air they occasion; and these, as well as the whirlwinds already mentioned, are generally accompanied with heavy rains, hail, and electrical displays. Whirlwinds are also of frequent occurrence in France and many other countries, doing great damage to vineyards and other crops; but in Great Britain they seldom occur.

Waterspouts are whirlwinds occurring on the sea and other sheets of water. When fully formed they appear as tall pillars of cloud stretching from the sea to the sky, whirling round their axes, and exhibiting the progressive movement of the whole mass precisely as in the case of the dust-whirlwind. The sea at the base of the whirling vortices is thrown into violent commotion, resembling the surface of water in rapid ebullition. It is a popular fallacy that the water of the sea is sucked up in a solid mass by waterspouts, it being only the spray from the broken waves which is carried up. Observations of the rain-gauge conclusively prove this.

What are sometimes called 'waterspouts on land' are quite distinct phenomena. They are merely heavy falls of rain of a very local character, and may or may not be accompanied with whirling winds. They generally occur during thunderstorms, or in the vicinity of thunderstorms, being quite analogous to severe hailstorms, from which they differ only in point of temperature, the heavy drops being probably no more than melted hailstones. Also all the moisture that falls is the result of condensation; whereas, in the true waterspout, the rain is mixed with spray which has been caught up from the broken waves, carried aloft by the ascending currents of the whirlwind, and ultimately precipitated with the rain.

Whisky (Gaelic, *uisge*, 'water;' *uisge-beatha*, modified into *usquebaugh*, 'water of life'), a spirit made by the distillation of the fermented extract from malted and unmalted cereals, potatoes, or any starch-yielding material. The best qualities are made either from malted barley alone, or from a mixed grist of barley-malt and dried barley and oats. Very large quantities of maize and rice are now used, whilst sugar and molasses, and smaller quantities of wheat, rye, sago, and other materials are employed. On the Continent potatoes and beet-root are extensively used, and artichokes and other roots are also employed. The mode of manufacture is described under DISTILLATION. Pure malt-whisky is almost exclusively made in Scotland, and always has been so, the pot-stills being used in the distillation. In Ireland pot-stills are most generally used, but, with the exception of two or three distilleries, malt forms only about one-third of the materials mashed, the remainder being barley, oats, and maize. In England large quantities of spirit are distilled by Coffey's still from a wort prepared from the raw cereals with some malt and sugar, whilst a few of the largest Scotch and Irish distillers make a portion of their produce in the same way. Much of this quality of spirit is used for making methylated spirit, and much for making gin, British brandy, and cordials, whilst some is used for blending with the pot-still spirit or whisky. Quantities of whisky identical with Irish are now made in Scotland. Wales has also its whisky distillery, and in England a few distillers are once more returning to pot-still whisky. Large distilleries for grain-spirit are at work in the United States, and for grain and potato spirit in Prussia, Sweden, France, Holland, Belgium, and Russia. Spirit is also distilled in Australia (Melbourne). The continental spirit, though of high strength and great purity, is more suitable for methylation, for fortifying wines, and for manufacturing and scientific purposes than for a beverage. In 1891 there were 9 distilleries in England and Wales, 136 in Scotland, and 31 in Ireland, The quantities of whisky for each of the three countries in that year were in gallons:

	England and Wales.	Scotland.	Ireland.
Proof-spirit manufactured.....	10,533,637	21,101,023	12,968,924
Consumption as beverage.....	18,458,548	6,549,359	4,821,146
In Bonded Warehouses..	9,912,952	54,312,195	26,903,477
Consumption per head.....	·627	1·569	1·026

It will be noticed that the spirits in bond are equivalent to three years' consumption. The revenue derived from the excise duties on spirits in the United Kingdom was in 1888 over £13,000,000, and in 1889 nearly that amount.

The export trade amounted in 1891 to 3,804,175 gallons at proof; nearly half of this quantity went to Australia, and a large quantity to the East Indies and to the west coast of Africa. Spirits exported are free of duty, and a drawback of 2d. per proof gallon is allowed. Proof-spirit consists of nearly equal portions by weight of water and absolute alcohol, the exact proportions being water, 50·76; alcohol, 49·24. The legal definition of proof-spirit is such as at 51° F. weighs twelve-thirteenths of an equal bulk of distilled water: its specific gravity is ·9231 at 51° F. With the present excise duty at 10s. 6d. per proof gallon, the distiller is slightly protected by the tax on foreign spirits being 10s. 10d. per proof gallon. The manufacture of whisky in the United Kingdom is under the control of the excise, and the principal governing statute is the Spirits Act, 1880.

In England and Scotland whisky gradually displaced the monopoly as a beverage formerly held by gin and brandy of continental origin. Distilling was practised in England as early as the 11th century, but was confined to the monasteries, the produce being used as a medicine. During the Tudor period distilling as a trade commenced, monopolies and charters were granted occasionally, and a system of licensing was adopted and greatly

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abused. Home or private distilling from grain was introduced into England from Ireland by settlers in different counties. In Scotland during the 14th century whisky had already displaced much of the imported continental spirit; the monasteries had for a long time preserved the secrets of distillation. By the middle of the 16th century a large trade was established, and house or cottage stills were found in all parts. In 1579 Scotch distilleries were taxed for the first time, and private distillation was interfered with. In Ireland as early as the 11th century the natives distilled 'uisge-beatha,' and no interference occurred till the 16th century, when licenses were enforced in the case of all but the gentry, offenders being made liable to capital punishment.

During the Great Rebellion the excise-tax on spirits originated in all parts of the kingdom. It was placed at 8d. per gallon in England, but was reduced to 2d; in Scotland and Ireland the tax was on the retailers; and the duties were 'farmed out' in all three countries. In Scotland by the time Charles II. was restored a considerable revenue was obtained. Soon after the Restoration the duty was fixed in England at 1d. per gallon, but it soon rose to 8d. per bulk gallon. Varying rates were subsequently established according to the materials used, the tax being levied upon the wort, which, according to its origin, was expected to yield 20 to 25 gallons of spirits per 100 gallons of the wort. In 1736, with the object of suppressing drunkenness, 20s. per gallon of spirits was levied on the retailer, a high license was charged, and the distiller's tax raised. But seven years' experience compelled the repeal of these provisions, for illicit distillation and illicit sales were enormous. The spirit tax was continued upon the wort, and for many years the rate stood at or near 2s. per gallon, with an expected yield of 19 gallons of spirit per 100 gallons of wort, so that the net tax on spirits was 2s. $\times \frac{100}{19}$ = 10s. 6d. per gallon. This high estimated yield forced distillers to use very strong wort, hence the spirit distilled was coarse, and the whole of the English produce went through the rectifier's hands before it was fit for consumption.

In Scotland at the Restoration the spirit tax was remodelled; and in some cases fixed sums were levied upon certain districts in lieu of the tax. Towards the end of the 17th century private distillation was again taxed, the taxes being as a rule farmed out; but the people vigorously resented the interference, for the licensing regulations were severe and unequal. At the Union the English system of levying the spirit duty on the trade distillers was introduced—viz. by an estimated spirit yield from the wort—and this system prevailed for the next eighty years, during which period the trade made great advances. Though the tax was similarly levied to the English method, it was not so heavy, so that Scotch whisky could be sold in London more cheaply than that of English make. The Scotch tax permitted of a lighter wort being made, so that the produce was less coarse than the English and did not require rectifying; a large English trade accordingly sprang up. But in 1784 the English distillers succeeded in getting the Scotch tax raised to an equality with their own, and 20 gallons at 1 to 10 over proof were expected from every 100 gallons of wort. Fine whisky could no longer be profitably made from a light wort; and if a stronger wort were used the spirit was coarse. The Highland distillers at this period only paid a license on their stills, and the Lowland distillers were in danger of being extinguished; but they succeeded in 1786 in getting the famous 'license system' introduced and the English system discarded. Still the Highlanders had great advantages in the license rate, and could sell in the Lowland markets. The Lowlanders soon brought skill to their aid. The original license rate was 30s. per annum for each gallon of the still's capacity, and an estimated rate of speed was allowed for in fixing this charge. By various improvements the enterprising distillers were able to far exceed the estimated spirit yield, and when this became known the tax was raised to £3, and so on till in a few years it mounted to £160 in some cases. No two distillers were taxed alike, and gross inequalities prevailed. To secure their high yields from taxation, smuggling was resorted to, and more particularly across the Border. The interference with cottage stills, especially in the Highlands, had encouraged illicit distillation; Glenlivet being famous as the home of the smugglers. The law was in fact defied, and even those in authority connived at the illegal practices; the revenue officers were powerless. Licensed distilleries were in some cases destroyed by the people. For many years smuggled spirit ruled the markets, and it is believed that for every licensed distiller either in town or country there were fifty or a hundred unlicensed ones. Not one-half the legitimate revenue was secured. Eventually, during the last years of George III.'s reign, the 'license system' was abolished and the English system again introduced with all its abuses. The estimated spirit yield being placed too high, the Scotch distillers were again threatened with ruin; the trade and the revenue fell off, so that by mere compulsion wiser regulations and a more moderate tax were adopted in 1816. Highland and Lowland systems were assimilated, but the smuggling so universally established could not be readily eradicated, and as late as 1822 not one-half the spirits made in Scotland paid duty. Trade fluctuations may be judged by one illustration; in 1816 there were only 36 licensed distillers in Scotland; next year, through some slight alteration in the law, there were 108.

In Ireland at the Restoration 4d. per gallon was imposed upon distilled spirits; and this duty continued for fifty years, but was then gradually raised till in 1815 it stood at 6s. 1½d. The license system as in Scotland was tried in Ireland; in 1779 no less than 1152 stills were licensed. An arbitrary number of distillings per still was recognised; it varied with the size of the still, but inversely, a still of 200 gallons capacity being assumed to work oftener than one of 500 gallons. This system favoured the large traders, so that of 210 trade distillers in 1798 only 51 survived in 1806, and then a license was refused for any still below 500 gallons content. As in Scotland for many years, a race took place between increased skill and an increased tax, whilst new inventions were discouraged by the government. The refusal to license the small stills immediately led to extensive smuggling from illicit stills (the produce of which was specially known as *potheen*). The smuggling was so universal that in 1815 to discourage illicit distilleries licenses were granted to stills of only forty gallons content. The smuggling flourished however, large illicit imports coming from Scotland. The restrictive legislation in Ireland accounted for the fact that, whereas in 1792 nearly 3½ million gallons of whisky paid duty at 1s. 2d. per gallon, yet thirty years after, with double the population, a considerably smaller number of gallons was charged when the rate was 5s. 6d.

During the reign of George IV. the present mode of charging the spirit duty upon the quantity at proof strength was introduced successively into Scotland, Ireland, and England. The table shows

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the rates in the three countries during the 19th century:

	England.		Scotland.		Ireland.	
	s.	d.	s.	d.	s.	d.
1802...	5	4½	3	10½	2	10½
1811...	10	3	8	0½	2	6½
1820...	11	8½	6	2	5	7½
1830...	7	6	3	4	3	4
1840...	7	10	3	8	2	8

	England.		Scotland.		Ireland.	
	s.	d.	s.	d.	s.	d.
1859...	8	0	8	0	8	0
1860...	10	0	10	0	10	0
1885...	12	0	12	0	12	0
1886...	10	0	10	0	10	0
1890...	10	6	10	6	10	6

Although illicit distillation on the large scale is occasionally attempted now, it is quickly suppressed. In the Highlands of Scotland a few detections are still made annually, but those in Ireland are very numerous, and average some fifteen or sixteen hundred annually. From the revenue point of view the loss is insignificant. The whisky retailed throughout the United Kingdom is generally of pure quality, though often too new. Occasionally attempts are made to remove from methylated spirit its distinctive odour and to retail it for drinking, whilst ether is also manipulated for sale in poor and populous neighbourhoods. The warehousing system was introduced for the convenience of distillers in 1804 in Ireland, extended to Scotland in 1823, and to England in 1848. The bonding system is now very extensively adopted.

Very recently a number of processes have been patented for artificially 'ageing' or maturing whisky, by electrical appliances or by aeration and flavouring. It is unlikely that the excise will permit any such processes to be applied to bonded spirits, so that they must be confined to duty-paid spirits. The practice known in the trade as 'grogging' as applied to whisky casks, and so extensively pursued from 1880 to 1890, has by the excise regulations of 1892 been peremptorily stopped.

Although the Select Committee on British and Foreign Spirits which sat in 1890 and 1891 were unable to settle upon any definition for whisky, yet much valuable information was collected. Compulsory bonding was not advocated, on account of its being unnecessary and impracticable. All British and Irish spirits, whether of pot-still or patent-still origin, were to be continued to be described as 'Plain British,' whether blended or not. It was shown, too, that out of an annual consumption in the United Kingdom of some 28 or 29 millions of proof gallons about 16 million gallons were from pot-stills. Of the total quantity of patent-still whisky or 'silent spirit' made in the United Kingdom about one-fourth was used for blending with pot-still whisky, and another fourth was sent to the rectifiers for manufacture into gin and cordials, but much patent-still whisky went straight into consumption.

Blending of whiskies and spirit of different origin is largely carried out in bond, and doubtless very extensively in the duty-paid stocks of dealers and retailers. Blending of pot-still and patent-still spirit is defended upon two grounds—viz. the mildness of the product and its cheapness; the latter being likewise the chief reason for the large blending operations. All commercial spirit, however pure, contains a small proportion of impurities or by-products of distillation, known as 'fusel-oil.' Fusel-oil includes the alcohols other than ordinary or ethylic alcohol, and it consists of propylic, butylic, and chiefly of amylic alcohol, with lesser quantities of still higher alcohols. Along with these alcohols there are minute quantities of acids, of ethers, and of pyro-compounds, the chief constituent of the latter class being furfurol. It has always been alleged that during the 'maturing' or 'ageing' of whisky these constituents of fusel-oil underwent decomposition, but the analyses of Dr Bell of Somerset House totally disprove this supposition. The only ingredient of fusel-oil that can be proved to diminish during storage is the furfurol, and this at a very slow rate. The probable cause for increased flavour and aroma in bonded whisky is the interaction of the spirit upon the bodies absorbed by the wood from the wine previously contained in the casks. This statement is supported by the fact that whisky stored in wine-casks soon doubles its original percentage of acidity whilst other constituents remain the same. Improved methods of 'maturing' spirits rapidly are based upon these facts. The total percentage of the bodies known collectively as fusel-oil ranges in pot-still whisky at proof strength from ·13 to ·21, and in patent-still or 'silent' spirit from 'nil' to ·05. Fusel-oil in less quantities than ·3 per cent. per proof gallon is harmless.

Whisky when first made is quite colourless, and all the admired colours of favourite brands or their imitations are produced either by storage in sherry and other wine casks, or by the direct addition of a little caramel syrup or of a 'maturing wine' to the spirits. The new whisky as it runs from the last distillation in a pot-still distillery varies in strength from proof to 50 over proof; at the latter strength it contains 80 per cent. by weight of pure alcohol. The strength varies with the mode of working. The patent-still spirit on the other hand, very properly called 'silent' spirit from its flavourless and other negative qualities, ranges in strength from 65 to 70 over proof as it runs from the still: at the latter strength it contains over 95 per cent. of pure alcohol by weight, and is of specific gravity ·8079 at 60° F. The chief centres of whisky distilling are the small towns and numerous villages in the Highlands and the Western Highlands of Scotland. Much is made in the Lowlands too. Large quantities of plain, patent-still, or 'silent' spirit are made in Edinburgh, Glasgow, and the towns near those places. Irish whisky is chiefly made in Dublin, and almost exclusively from pot-stills. It is also made in Belfast, Cork, Londonderry, Limerick, and many other towns, but large quantities of patent-spirit are also made in the same towns. In England almost the whole of the spirit production consists of patent-spirit, London and Liverpool being the centres of the manufacture. Pot-still whisky is now made at Bristol, and at Frongoch in North Wales.

In the United States spirit manufacture is largely carried on, the spirit being commonly made from maize (corn whisky) or rye. Wheat also is largely used. Bourbon whisky was a term originally given to whisky made of wheat or maize in Bourbon county, Kentucky. The whisky from Pennsylvania and the brand known as 'Hermitage Bourbon' from Kentucky are best known and obtain high quotations. The chief distillery states are Illinois, Ohio, Kentucky, Indiana, New York, and Pennsylvania. As in Britain, the tax on distilled spirits is the most important source of internal revenue from manufactures. In the United States the tax was first imposed in 1791, but led to the Whisky Insurrection (q.v.), and was abolished. Reimposed during the war years 1812–15, it was renewed till 1862, when the rate was 20 cents per gallon manufactured; in 1864 it was raised to 60 cents, to $1·50, and to $2. In 1868 it was reduced to 50 cents; in 1872 it was 70 cents; in 1875 it was fixed at 90 cents, at which it was retained. But during 1868–72 various additional taxes were imposed on distilling and distillers amounting to nearly 70 cents per gallon more. In 1863 the revenue from spirits was $5,176,530; in 1864, $30,329,150; and with violent fluctuations from year to year it rose to $55,606,094, but did not again reach so large a figure till 1876 and 1877. In 1880 the figure was $61,185,509; in 1884 the figure was $76,905,385, out of a total internal revenue of $121,368,620. After that date a decline set in.

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The duty on imported spirits under the M'Kinley tariff was fixed at $2·50.

See, for history, Morewood's *Inventions and Customs in the Use of Inebriating Liquors* (1824), and Scaribrick's *Spirit Manual* (1891); and for technical processes, Maercker's *Handbuch der Spiritus-fabrikation* (4th ed. 1886), and *The Manufacture of Spirits*, by the present writer (1892). See also the articles ALCOHOL, EXCISE, FUSEL-OIL, SMUGGLING.

Whisky Insurrection, the somewhat extravagant title for an outbreak which occurred in Western Pennsylvania in the summer of 1794. It arose from discontent with the excise regulations, and culminated in open riot and the destruction of private property; but by the efforts of leading citizens the rising was quelled without the aid of the 15,000 troops which Washington promptly sent against the insurgents.

Whist, a game at cards, believed to be of English origin; probably a development of the game of *trump* (or *triumph*), which was played in England at least as early as the time of Henry VIII. Trump is mentioned in a sermon delivered by Latimer on the Sunday before Christmas 1529. The game of trump is also mentioned by Shakespeare punning on the word triumph in *Antony and Cleopatra*, act iv. scene 12. The game of whist is not mentioned by Shakespeare, or by any writer of the Elizabethan era.

The earliest mention of *whist* (or *whisk*) is in the poems of Taylor the Water-poet (1621). In the first edition of Cotton's *Compleat Gamester* (1674) whist is described as a game 'commonly known in England.' Cotton says that 'the game of whist is so called from the silence that is to be observed in the play;' this derivation was adopted by Dr Johnson, to the extent of explaining whist to be a game requiring silence, and it has been generally accepted by modern etymologists.

Whist was formerly played nine-up. The change to ten-up took place about the first quarter of the 18th century. Whist played ten-up is called *long whist*. About 1785 the experiment of dividing the game into half was tried, and *short whist* was the result. The short game soon came into favour; and in 1864 the supremacy of short whist was acknowledged by the adoption as the standard of the laws of short whist framed by committees of the Turf and Portland clubs.

Edmond Hoyle (q.v.), the first writer of any celebrity on whist (commonly called the father of the game), published his *Short Treatise* in 1742. He used to give lessons in whist at a guinea a lesson. His *Short Treatise* ran through many editions during his lifetime; and since his death his works have been reproduced in numberless ways. Hoyle died in Welbeck Street, Cavendish Square, on August 29, 1769, at the age, so it is said, of ninety-seven.

The game of whist is played by four persons, two being partners against the other two. The partners sit opposite to each other. The partnership is determined by cutting. The two lowest are partners against the two highest, and the lowest has the deal and the choice of seats and cards. In cutting, the ace is lowest. Each player has a right to shuffle the pack once before each deal, the dealer having the privilege of a final shuffle. The shuffling being concluded, the player to the dealer's right cuts the pack. The dealer, having reunited the packets, is bound to deal the cards one at a time to the players in rotation, beginning with the player to his left. He turns up the bottom card (called the trump card). The deal being completed, the players sort their cards, and the player to the dealer's left (or leader) plays a card face upwards on the table. The other players follow in rotation, being bound to follow suit if they can. When all have played, the trick is complete. It is then gathered and turned over by the winning side. The highest card wins the trick. The ace is highest in playing; and the other cards reckon in the order king, queen, knave, ten, &c., down to the deuce, or two, which is lowest. If any player cannot follow suit (i.e. has none of the suit led), he may play any card he pleases. If he plays a card of the suit turned up (called trumps), he wins the trick, unless another player also, having none of the suit led, plays a higher trump. The player who wins the trick becomes the leader for the next trick, and so on till the whole hand (consisting of thirteen tricks) is played out.

After scoring, the player to the last dealer's left deals in his turn; and in subsequent deals each player deals in turn, the rotation going to the left.

Scoring.—The side winning more than six tricks reckons one for each trick above six; and the side holding, either separately or conjointly, more than two of the following cards, ace, king, queen, and knave of trumps (called honours), reckons as under: If they hold any three honours, they score two; if they hold four honours, they score four. Players who are at four cannot score honours. The side first reaching five, in one hand or in a succession of hands, scores a game, valued thus: a single, if the adversaries have already scored three or four; a double, if they have scored one or two; a treble, if they have scored nothing.

A rubber consists of the best two games out of three. If the same players win two consecutive games, the third is not played. The winners of the rubber score in points the value of the games they have won; when the rubber has consisted of three games, the value of the loser's game is deducted. And whether two or three games are played, two points are added for the rubber. Thus, if A B (partners) win a single and a double, they win three points on the games, and they add two for the rubber, making five points. Had A B won the same, but Y Z (their opponents) won a treble, they would have to deduct three points, the value of the opponents' game, and would win only two points.

Whist is a mixed game of chance and skill. The chance resides in having trumps and other good cards dealt. The skill consists in the application of such knowledge as shall, in the long run, turn the chances of the cards in the player's favour. At the commencement of the hand, the first lead presents a problem of almost pure chance; but as the hand proceeds observation of the fall of the cards, inference therefrom, memory and judgment come in, so that the end of a hand often presents a problem of pure skill. It is these ever-varying gradations of skill and chance that give the game its chief interest as a scientific pastime.

To become a skilful player it is necessary to bear in mind that the game is not one of any given player's hand against the other three, but a combination of two against two. In order that two partners shall play their hands to the best advantage, they must strive, as much as possible, to play the two hands as though they were one. To this end it is advisable that they should pursue some uniform system of play, so that each partner shall understand the plans of the other, and be placed in the most favourable position to assist him in carrying them out. The experience of a hundred and fifty years has developed a system of play tending to this result.

1. The first, or *original*, lead should be from the player's strongest suit. A strong suit is one that contains either a large number of cards (four or more) or several high cards. The suit containing the largest number of cards (numerical strength) is the one to be mostly preferred. The object

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aimed at in opening the strongest suit is to exhaust the cards of that suit from the other hands. When this object is accomplished, the cards of the suit which remain in the leader's hand (called long cards) obtain a value which does not intrinsically belong to them. They often become of great service, for when led they either compel the adversary to trump or they make tricks. And when trumps are all out the player who has the lead makes as many tricks as he has long cards. On the other side, by opening weak suits there is considerable risk of sacrificing partner's strength, and of leaving long cards with the opponents.

2. Some players are prone to lead single cards, but experience shows that weak leads, as a rule, do more harm than good. Sometimes a trick or two is made by playing a trumping game; but the chances are that such tactics sacrifice partner's hand, and clear the suit for the adversaries.

3. The leader should open with the lowest card of his strong suit, in expectation that the third hand will play his highest, and so assist in clearing the leader's strong suit. Moreover, if the leader keeps the best cards of his suit in his own hand, he has a fair chance of getting the lead again when his suit is nearly or quite established. But with ace and four or more small ones it is advisable to begin with the ace, lest the ace be trumped on the second round. Also, with a high sequence in the strong suit it is best to lead one of the sequence first, lest the adversaries win with a very small card.

4. For the ordinary leads from high sequences any elementary work on whist may be consulted. For refinements on the American system of leading, and also for the cases in which the fourth-best card should be led in preference to the lowest, the more advanced treatises of 'Cavendish' may be referred to.

5. After the first trick the lead may remain with the first leader. His best play, as a rule, is to continue his suit. If the lead falls to another player, his play will be, in most cases, to open his best suit; and so on. If the lead falls to the first player's partner, he has choice of two modes of play. If he has a very strong suit of his own, he would often be right to open it; if not, he would generally do well to continue the suit his partner first led, or, as it is commonly called, to return his partner's suit. The object is to strengthen partner by assisting to clear his strong suit.

6. When returning a suit, if the player has only two cards of it remaining in his hand, he should return the highest; if more than two, the lowest. The exception is, if he has the winning card, he should return that irrespective of the number of cards in the suit. The reason is that with but two cards of the suit remaining the player is weak in the suit, and he is therefore bound to sacrifice his good card to support his partner. But with three or more remaining after the first round he is strong, and is therefore justified in calling on partner to support him.

7. This rule of play is most important. It should be carefully observed with even the smallest cards, as it enables partner to determine the situation of the remaining cards. For example: A leads a suit in which B (his partner) holds ace, three, and two. In returning A's suit, after winning with the ace, B is bound to return the three, and not the two. When B's two falls in the third round A will know that his partner has no more of the suit. But suppose B's cards to be ace, four, three and two. In returning the suit B is bound to choose the two. Then after the third round A will conclude with certainty that B has at least one more card of the suit.

8. Late in a hand the considerations with regard to the lead vary. If there is no indication to the contrary, it is best for each side to continue the suits originally opened by them. But the fall of the cards may show that it is disadvantageous to persevere in the suits first led. In such cases the player must have recourse to other and weaker suits. The general rule to be observed here is to choose a suit in which there is reason to infer that the right-hand adversary is weak, or—but this is less favourable—one in which the left-hand adversary is strong. In either case, if the suit chosen contains but three cards, none higher than knave, or only two cards, it is in most cases right to lead the highest.

9. The second player, as a rule, should play his lowest card, in order to preserve his strength in the leader's suit. The first trick in the suit is left to partner, who has an even chance of holding a better card than the third player. But if the second hand has a strong sequence, he should play the lowest of the sequence, by which partner's hand may be saved, and a high card still remain over the original leader.

10. When a high card is led it is sometimes advisable for the second player to cover it with a higher one. For details of the play of the second hand, as regards playing a high card, or covering the card led, some systematic treatise should be studied.

11. When the second hand has none of the suit led he should trump, if he has but two or three trumps; but he should not trump a doubtful card if he has more than three trumps. This will be further explained when treating of the management of trumps.

12. The third hand, as a rule, plays his highest card in order to support partner in his suit. The exceptions are: with ace, queen, &c. the queen is to be played; and if partner has begun with a high card, it is often right to pass it.

13. *Management of Trumps.*—With strength in trumps (i.e. with four or more) they should not be used for trumping, if it can be avoided, but should be kept together, in hopes of establishing a suit, and of remaining with the long trump, with which to get the lead after the other trumps are out, and so to bring in the suit. Thus if the opponents lead a losing or doubtful card it is better, as a rule, not to trump it when holding four trumps. But if the opponents lead a winning card it is generally advisable to trump it, though holding four trumps.

14. With five trumps the chance of succeeding in exhausting the opponents' hands, and of remaining with the long trump, is so considerable that a player having five or more trumps should lead them; and as number is the principal element of strength, he should not be deterred from leading trumps merely because the fourth hand has turned up an honour.

15. With four trumps only, first lead the strong suit. When the adversaries' hands are cleared of that suit, or so far cleared that the holder of the long cards in that suit commands it, it is, as a rule, safe to lead from four trumps.

16. A player is only justified in leading from weak trumps if he holds winning cards in every suit; if the adversaries are both trumping a suit; or if the game is lost unless partner has strength.

17. It is most important to return partner's trump lead at once, unless he has led from weakness; for partner, by leading trumps, declares a strong game, and it is then the best policy to abandon one's own plans, and to support his.

18. It follows that a player should seldom lead a card for his partner to trump, unless he has four or more trumps; for with less than four trumps he is weak; if he forces his partner to trump, partner is weakened also; and the chances are that by weakening partner under such circumstances the command of trumps will remain with the adversaries.

19. But a player may force his partner, although

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weak himself, if partner has already been forced, and has not afterwards led trumps; if partner has already declared weakness in trumps, as by trumping a doubtful card second hand; if two partners can each trump a different suit; and when one trick from partner's hand wins or saves the game.

20. The same considerations which make it inexpedient to force partner when weak one's self show the advantage of forcing a strong trump-hand of the opponents.

There are yet some general rules of play to be explained.

21. The second, third, and fourth players should always play the lowest of a sequence. The rule here given is in conformity with the play that would naturally be adopted in playing cards that are not in sequence; and by keeping to a uniform plan players are enabled to infer what cards their partner does or does not hold. It is true that the adversaries often gain the same information; but it is found by experience that it is of more advantage to inform partner than to deceive the opponents.

22. As a rule, it is advisable to lead out the winning cards of partner's suit. The presumption is that he has led from his strong suit; and by leading out the winning cards the suit is cleared for him, and his long cards are not obstructed. The reverse applies to suits led by the adversaries. It is mostly right to retain the winning cards of such suits as long as possible, in order to stop the establishment of the suit.

23. When a player has none of the suit led, he should throw away from his weakest suit; for by discarding from a strong suit its numerical power is damaged. But when the adversaries have shown great strength in trumps it is not advisable to keep small cards of a long suit, as it is not likely that it can ever be brought in. Under such circumstances the player should throw away from his best protected suit, and keep guards to his weaker ones.

24. Players should watch the cards as they are played, and endeavour to infer from them where the others lie. Thus, if a player wins a queen with an ace it may be inferred that he has not the king, the rule being to win with the lowest; if a player leads trumps at starting it may be inferred, as a rule, that he is strong in trumps, or has a very fine hand. By recording in this way, and by counting the number of cards played in each suit, skilled players will often, towards the close of a hand, know the position of all the important cards remaining in; and by means of this knowledge they will be able to play the end of the hand to the same advantage as though they had seen all the cards.

25. And lastly, players should play to the score. Thus, wanting but one trick to save or win the game, a winning card should be played at once. The example is stated as for one trick; but it should always be kept in mind how many tricks are requisite to win or save the game, or even a point, and the play should be varied accordingly.

ILLUSTRATIVE HAND.

The following example is given to show how the play at whist is conducted in accordance with the preceding general rules, and also how inferences from the fall of the cards may be drawn and used. The example is of the simplest kind, and is not intended to exhibit any fine stroke of play. A, Y, B, and Z are the four players; they sit round the table in the order of the letters, A B being partners against Y Z. A is the first leader, and Z the dealer. We will suppose the reader to be A, the score to be love-all, and Z to have turned up the two of hearts.

A'S HAND.

Ace, 2 of.....Spades.
Queen, 8, 7, 4 of.....Hearts.
9, 6, 5 of.....Clubs.
Queen, Knave, 7, 2 of.....Diamonds.

[*Note.*—It is a great assistance to inexperienced players to sort A's hand from a pack, and play a card to each trick from the remainder of the pack, as would be done in actual practice.]

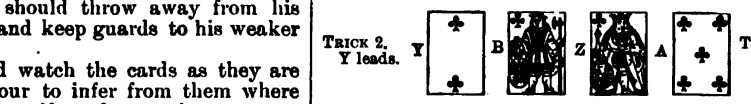
THE PLAY.

[*Note.*—The cards in each trick are placed in the order in which they are played, the leader's card standing first. The capital letter in front of each card shows by whom it is played.]

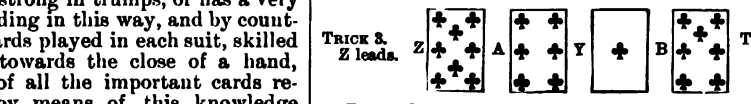
Remark.—A leads from his strongest suit. He leads the lowest card of it. (For reasons, see above, sects. 1, 3.)

Inferences.—B being unable to win the king, A should note that the best diamond is against him, probably in Y's hand as the rule is with ace and king to put on king second hand. Some players put on king second hand with king and one small one; but the smallest should generally be played, unless the second hand holds a sequence. B dropping the nine, and A holding queen and knave (refer to A's hand), A concludes B to have ten or no more, the rule being to play the smallest when unable to head the trick.

It is in this way, by comparing the cards which fall with those remaining in hand, that players obtain an insight into the game to guide them in their future conduct.

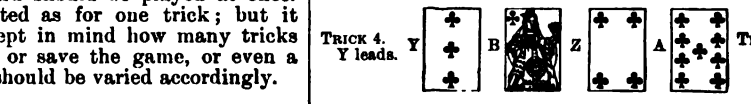


Inference.—A infers clubs to be Y's strongest suit. This inference does not affect the subsequent play. But it might; and, at all events, it is an inference that A ought to draw.

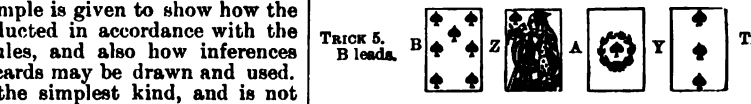


Remark.—Z returns his partner's lead (for reasons, see sect. 5).

Several inferences might here be drawn as to the position of the remaining clubs—as, for instance, that B has the queen; but as they do not affect the play, they are omitted, for the sake of brevity.



Remark.—Y continues his suit (for reasons, see sect. 1).



Inferences.—Spades may be taken to be B's strongest suit. B leads his fourth-best spade, in preference to his lowest. The reasons for preferring this card (an American lead) are too long for insertion here. They must be sought for in exhaustive treatises.

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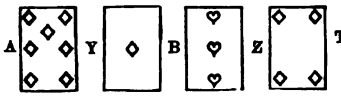
Z, putting on queen second hand, probably has king (see sect. 9). Also, he may be presumed not to hold the knave, or he would play the lowest of the sequence (see sect. 21).

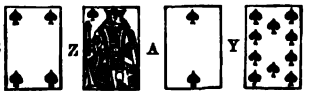
Trick 6. A leads. A Y B Z Trick 6. B wins.



Remark.—A continues his suit. As a rule, with second and third best (in this case, queen and knave), one of those should be led; but B having played the nine to the king, in the first trick (refer to trick 1, and last inference therefrom), A would part with strength unnecessarily by leading a high card, as B either has the ten or will trump.

This is an example of departure from rule owing to previous fall of cards.

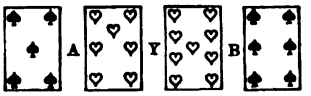
Trick 7. B leads. B Z A Y Trick 7. Z wins.



Remark.—B continues his suit.

Inference.—The ten falling from Y's hand, it may be inferred that he holds no more (see remark, trick 8).

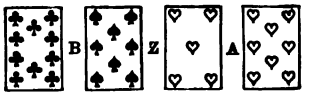
Trick 8. Z leads. Z A Y B Trick 8. Y wins.



Remarks.—As regards the lead of the spade here, it may seem at the first glance to be contrary to the rules of play advocated in the preceding article. It is a return of the adversary's lead, and up to the strong hand. But it must be remembered that whist is not a stereotyped game of rule; rules can only be given for the general case, and they have to be departed from more or less frequently as the scheme of the hand becomes developed. Z is bound to play to force his partner in order to make the fifth trick, and so to save the game if Y has an honour. Owing to the American lead of seven of spades (at trick 5), Z can count that B remains with three spades, all higher than the seven (the seven being his fourth best), and therefore that Y has no more spades.

A also can count that Y has no more spades. He trumps with the seven of hearts to prevent Y from winning the trick with a very small trump. As the cards happen to lie A's trump is wasted, but the play must not be judged by the result.

Trick 9. Y leads. Y B Z A Trick 9. A wins.

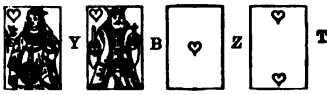


Remark.—Y leads the thirteenth club.

Inferences.—It is probable, from this lead, that Y has strength in trumps, such as an honour guarded. When a thirteenth card is led before trumps have been played, it generally means that the leader wants his partner to put on his best trump, in order to make trumps separately. It may be, however, that the leader only wants his partner to be led up to if the thirteenth card is trumped by the fourth hand. It is a difficult point in the game for the third hand to know whether to play a high trump on a thirteenth card or to pass it.

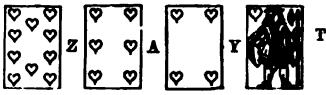
A further inference from this trick is that Z is weak in trumps, as he only puts on the five. If he trumps at all, he will most likely trump with his highest. Looking at the fact that if the trump lead comes from A the lead will be presumably up to a weak suit, and also that A has the best diamonds and his partner the remaining spades, A determines to lead a trump. Accordingly,

Trick 10. A leads. A Y B Z Trick 10. B wins.



Remark.—Holding but two of the suit, A leads his best (see sect. 6).

Trick 11. B leads. B Z A Y Trick 11. Y wins.



Remark.—B returns his partner's lead of trumps. As a rule, partner's trump lead should be returned immediately (see sect. 17); but it does not follow that B is bound to return trumps here, a strengthening trump being led late in the hand. B, however, does well to return the trump in this case, as, on the whole, the best chance for the odd trick is to bring down all the trumps, and to find A with the winning diamonds.

Tricks 12 and 13.—Y (trick 12) leads a diamond (he has only diamonds in hand), and A makes the knave and queen.

A B score the odd trick.

See *Laws and Principles of Whist*, by the present writer, 'Cavendish' (20th ed. 1892); *Whist Developments, and the Unblocking Game*, by 'Cavendish' (4th ed. 1891); *Short Whist*, by James Clay (new ed. 1881); *Philosophy of Whist*, by Dr Pole, F.R.S. (6th ed. 1892); *Art of Practical Whist*, by Major-general Drayson (5th ed. 1892); and *Whist Manual*, by R. F. Foster (1890).

Whistler, James Abbot M'Neill, painter and etcher, was born at Lowell, Massachusetts, in 1834, a son of Major George Washington Whistler, consulting engineer of the St Petersburg and Moscow Railway (1800–49). He studied for a time at West Point, next came to Paris, worked for two years in the studio of Gleyre, and afterwards settled in London. In 1884 he became a member of the Society of British Artists, of which he was president from 1886 to 1889. In France he received a medal (3d class) at the Salon of 1883, a gold medal at the Exposition of 1889, and was 'Hors Concours' at the Salon in 1892; and he was made Chevalier (1889) and Officer (1891) of the Legion of Honour. In 1889 he was elected a member of the Munich Academy, and received the Cross of the Order of St Michael.

In 1859 he began to exhibit in the Royal Academy, showing 'Two Etchings from Nature,' which were followed in 1860 by five dry-point portraits and etchings of Thames subjects, and an oil-picture of a mother and child 'At the Piano,' which was purchased by John Phillip, R.A. Three years later his 'White Girl' was rejected by the jury of the Paris Salon, but attracted considerable attention in the Salon des Refusés. Since then he has exhibited frequently in the Salon, the Academy, the Grosvenor Gallery, the Society of British Artists, and in 1874 and 1892 he has held exhibitions of his paintings in London.

The finest of his oil-pictures are 'The Artist's Mother—an arrangement in Black and Gray,' shown in the Royal Academy of 1872, awarded a gold medal in the Salon of 1884, and purchased for the Luxembourg Gallery in 1891; the 'Portrait of Thomas Carlyle,' shown in the artist's exhibition of 1874, and purchased by the Glasgow Corporation in 1891; and the 'Portrait of Miss Alexander—Harmony in Gray and Green.' In addition to many other portraits, such as those of Señor Sarasate, Miss Rosa Corder, Irving as Philip II., and Lady Archibald Campbell, he has produced some fascinating figure subjects and views on the

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Thames, &c. in oils. He is also a skilful worker in pastels upon tinted paper; while as a purely decorative artist he is known by the 'Peacock Room,' painted in 1877 in Mr Leyland's house at Prince's Gate, London, and by the 'Music Room' in Señor Sarasate's residence in Paris.

As an etcher and dry-pointer Whistler's eminence is even more widely recognised than as a worker in colour. His etchings include 'The French Set,' (13 subjects, Paris, 1858); the 'Thames Set' (16 subjects, London, 1871); the 'First Venice Set' (12 plates, London, 1880); the 'Second Venice Set' (26 plates, 1886). In addition to these series Whistler has executed many admirable single plates, including some splendid portraits in drypoint. The total number of his etchings, as catalogued by Frederick Wedmore in 1886, was 214, and their freedom, spirit, and unerring selection of line entitle him to rank as the chief of living 'painter-etchers.' He has also executed a few lithographs of very varying merit, the *Songs on Stone* (1892) especially illustrating his skill.

In *Fors Clavigera* for July 1877 Ruskin made a most intemperate attack upon the paintings exhibited by Whistler in the Grosvenor Gallery, and next year the artist sued the critic for libel. The trial attracted much attention, and ended in a verdict for the plaintiff of one farthing damages without costs. Whistler retaliated in a pamphlet, 'Whistler *v.* Ruskin: Art and Art Critics,' which, along with his brilliant 'Ten O'Clock' lecture, and various occasional letters upon art and personal subjects, were collected in *The Gentle Art of Making Enemies* (1890; augmented ed. 1892).

Whistler's art is original and individual. He never trusts for effect to attractiveness of subject, to human sentiment or anecdotal interest. The charm of his work lies in its technical qualities, in its skilful combinations of tone and colour, of line and mass; and severely restricting himself in his artistic aims, he attains with singular perfection those which he values and for which he strives.

Whiston, WILLIAM, mathematical divine, was born at Norton rectory in Leicestershire, 9th December 1667. Educated privately, partly because his father's blindness required his aid, he at length entered Clare College, Cambridge, where he distinguished himself greatly in mathematics, and obtained a fellowship in 1693. He next became chaplain to the Bishop of Norwich, and in 1698 was presented to the living of Lowestoft in Suffolk. His *Theory of the Earth* (1696) brought him a considerable reputation, and in 1703 he was appointed to succeed Newton in the Lucasian professorship at Cambridge. But his theological studies unfortunately led him to regard Arianism as the primitive form of Christianity, and with characteristic honesty he made no secret of his convictions. In 1710 he was expelled from his professorship and the university, and the case against him, if it was conducted deliberately without energy, at least lasted five years. He was preached against and refused communion by the clergy, foremost among whom raged Sacheverell. His *Primitive Christianity Revived* (5 vols. 1711–12) included the famous heretical essay on the Apostolic Constitutions. Whiston spent the remainder of a blameless and busy life in London, usually in straitened circumstances, incessantly employed in writing, in controversy, in scientific crotchets, lectures, and the services of a 'Primitive Christian' congregation he had started in his own house. Though an Arian he was a strong supernaturalist, and could defend causes such as prophecy and miracle—even anointing the sick and touching for the evil. His clerical monogamy —now remembered for Dr Primrose's sake alone— was the least whimsical of his peculiar notions, for his identification of the lost tribes of Israel with the Tartars has since been far surpassed. He died in London, 22d August 1752. Whiston's translation of Josephus (1737) is still printed—a carefully revised edition by the Rev. A. R. Shilleto was published in Bohn's Library in 1890; his Life of Samuel Clarke (1730) deserves to be; and the *Primitive New Testament* (1745) is a unique curiosity. His Memoir (3 vols. 1749–50) conveys a very vivid image of this strange, whimsical, eccentric, but thoroughly honest and conscientious man.

Whitbread, SAMUEL, born in 1758, a London brewer's son, from Eton passed to Oxford, and in 1790 entered parliament. Under Pitt he was leader of the opposition, and in 1805 headed the attack on Lord Melville. He was an intimate friend of Fox. He protested against the rupture of the peace of Amiens, and on Napoleon's escape from Elba denounced all interference with the French in their choice of a ruler. He died by his own hand when insane, 6th July 1815.

Whitby, a seaport and watering-place in the North Riding of Yorkshire, 54½ miles by rail (by road 45) NNE. of York and 22 NNW. of Scarborough. It stands, looking northward over the German Ocean, at the mouth of the Esk, which here emerges from its wooded dells and forms a wide tidal pool, walled in by jet-veined cliffs of alum shale. A stone bridge (rebuilt 1835), 172 feet long, with a swivel by which vessels are admitted to the inner harbour, connects the two halves of the town. Its older portions on the east side, with steep narrow streets and passages or yards, and red-tiled houses, climb tier upon tier up the cliff, where in decaying beauty stand the ruinous abbey of St Hilda and the ancient parish church of St Mary. St Kilda (614–680) founded in 657 the monastery of Streanshalh for religious of both sexes, which has memories of Cædmon and St John of Beverley, and where in 664 was held the great 'Council of Whitby' (see Vol. IV. p. 173). It was burned by the Danes in 867 (they or their successors changed the name of the place to *Presteby* or *Whyteby*, 'priests' or white town'), but in 1078 was refounded by William de Percy as a Benedictine abbey for monks—the nuns of Scott's *Marmion* are a poetical invention. The stately ruins of the church, which was 300 feet long, are Early English and Decorated in style, and comprise choir, north transept, and part of the nave, the great central tower having fallen in 1830. Between the abbey and the cliff is the parish church, originally Norman, gained from the town by a flight of nearly 200 steps; and on the south side is Whitby Hall, built about 1580 by Sir Francis Cholmley, and restored in 1867. Of modern buildings may be mentioned the town-hall (1788), the museum (1823) on the west pier, and the Saloon (1878), in Queen Anne style, with concert-room, promenade, &c., on the side of the West Cliff, which is surmounted by the fashionable terraces of Hudson, the 'Railway King' (1845). The west and east piers, 300 and 800 yards long, protect the outer harbour; and at the extremity of the former is a lighthouse (1831), 83 feet high, like a Doric column. The lighthouse on the east pier is of a lower altitude. The whale-fishery (1733–1837) belongs to the past, but the shipping is still considerable, consisting now almost entirely of iron steamers trading mainly from the Welsh coal ports to the Black Sea, America, and India. Iron shipbuilding is carried on by one firm, though Captain Cook, who was a 'prentice here, might no longer choose Whitby-built ships as 'the stoutest bottoms' in England for his circumnavigation of the world. The herring and other fisheries are actively prosecuted; but Whitby's specialty is the manufacture of Jet (q.v.)—a manufacture now, however, greatly decayed. Whitby and its

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neighbourhood offer a rich field for geological research, and its museum contains a fine collection of fossils obtained in the locality, including large specimens of crocodile and alligator species from the lias formation. Whitby is surrounded by scenery of remarkable variety and beauty. It returned one member of parliament from 1832 till 1885. Pop. (1851) 10,989; (1891) 13,274.

See works by Charlton (1779), Young (1817), F. K. Robinson, *Whitby Glossary* (1876), *Whitby and its Abbey* (1860); Dr Atkinson, *Whitby Chartulary* (1879); also Mrs Gaskell's *Sylvia's Lovers* (1863), and Mary Linskill's stories.

Whitby, DANIEL, was born at Rushden in Northamptonshire in 1638, studied at Trinity College, Oxford, graduating B.A. in 1657, and was elected fellow of his college in 1664. He became prebendary of Salisbury in 1668, rector of St Edmund's, Salisbury, in 1672, and died there, March 24, 1726. His first writings were a series of hot attacks on popery, but in 1683, unfortunately for his peace, he turned from rending the papists to seeking a basis of union with the Dissenters, and so brought down upon his head the furious wrath of Oxford and his bishop. His book, which was entitled *The Protestant Reconciler*, was publicly burned at Oxford, and his diocesan, Dr Seth Ward, made him sign a strong expression of his repentance for having 'through want of prudence and deference to authority' printed a book containing these false, erroneous, and schismatical principles: (1) that it is not lawful for superiors to impose anything in the worship of God not antecedently necessary; and (2) that the duty of not offending a weak brother is inconsistent with all human rights of making laws concerning indifferent things. In the second part of his *Protestant Reconciler*, published also in 1683, he attempted to smooth down the objections of the Dissenters to re-enter the Church of England. His next important task was *A Paraphrase and Commentary on the New Testament* (2 vols. 1753). In his *Discourse* on Election and Reprobation (1710) he spoke out the Arminianism for which he had exchanged the Calvinism of his training. Dr Clarke's *Scripture Doctrine of the Trinity* converted him to Arianism, and he published Arian tracts and treatises which brought him controversy with Waterland. In this faith he died, 24th March 1726, as we find from his *Last Thoughts* (1727).

Whitchurch, a market-town of Shropshire, on an eminence, 19 miles N. by E. of Shrewsbury by railway. Malting and brewing are carried on. Pop. (1851) 3519; (1891) 4002.

White. See WHITE PIGMENTS.

White, GILBERT, author of the *Natural History of Selborne*, was born at Selborne (q.v.) in Hampshire, on July 18, 1720. Educated at Basingstoke under the Wartons' father, in 1739 he entered Oriel College, Oxford, and in 1744 obtained a fellowship, in 1747 took orders, in 1752 became senior proctor of the university, and in 1758 accepted the sinecure college living of Morton Pinkney, Northamptonshire. Six years before he had retired to his native village, to indulge his taste for literature and natural history; and there he died on June 20, 1793. His charming *Natural History and Antiquities of Selborne*, which has made White an English classic, was projected in 1771, and published in 1789. Probably no book on natural history has been more frequently reprinted. Among its countless editions may be mentioned those of Jesse (1851), of Frank Buckland, with a chapter on antiquities by Lord Selborne (1875), of Prof. Bell (1877), and of Richard Jefferies (1887). His MS. journal (6 vols. 1768–89), comprising letters, poems, and a full day-to-day weather report, was found in 1880.

White, HENRY KIRKE, minor poet, was born son of a butcher at Nottingham, March 21, 1785. At fifteen he was apprenticed to an attorney, and here he gave his leisure hours to study with intemperate zeal. He also became a member of a literary society in Nottingham, and sent contributions to the *Monthly Mirror*. These soon attracted the attention of Mr Hill, its proprietor, and Mr Capel Lofft, on whose recommendation he published in 1803 a small volume of poems, which was received by the critics with a lack of enthusiasm into which his sensitive mind read malignity and hatred. But the book secured him the friendship of the kind-hearted Southey and the evangelical pontiff, the Rev. Charles Simeon, through whose influence a sizarship in St John's College, Cambridge, was procured for him. He gave himself to his studies with a zeal that consumed the energies of a constitution always delicate; consumption rapidly developed, and he sank into the grave, October 19, 1806. Southey edited his *Remains* (2 vols. 1807), with a sympathetic memoir, which does justice to his character, and more than justice to his poetry.

White, JOSEPH BLANCO, was born at Seville, July 11, 1775, descended from an Irish Catholic family settled in Spain. He was ordained a priest in 1799, but ere long lost his faith, and in 1810 made his way to England, where he lived the rest of his life. He was tutor to Lord Holland's son (1815–16), and took orders in the English Church, was made M.A. by diploma of Oxford in 1826, settled as a member of Oriel College, lived as tutor in Whately's family at Dublin (1832–35), but fled to Liverpool when he found it impossible longer to believe in the Trinity or the endowment of doctrines or Articles. He edited at London a monthly Spanish paper, *El Español* (1810–14), and when it stopped was granted a pension of £250 a year from the English government. He died at Liverpool, where he had lived six years, 20th May 1841. He contributed to the *Quarterly* and *Westminster* reviews, edited the short-lived *London Review*, wrote *Letters from Spain* (1822), *Practical and Internal Evidence against Catholicism* (1825), *Poor Man's Preservative against Popery* (1825), and *Second Travels of an Irish Gentleman in Search of a Religion* (2 vols. 1833). His most important work is the posthumous autobiography, edited by J. Hamilton Thom (3 vols. 1845), a remarkable self-revelation of a profoundly religious soul seeking for a certainty that is ever impossible to find. But Blanco White's name lives best in literature by his one immortal sonnet, 'Night and Death,' which first appeared, with a dedication to Coleridge, in the *Bijou* for 1828. A corrected copy made by White in 1838 is printed in the *Life*. A third version was communicated to Mr William Sharp, editor of *Sonnets of the Century*, and is printed, together with the two former, in the *Academy* for September 12, 1891. It shows many interesting variations, and avoids the only faults of the sonnet as usually printed:

> Mysterious Night! when our first parent knew
> Thee by report Divine, and heard thy name,
> Did he not tremble for this goodly frame,
> This glorious canopy of light and blue?
> But through a curtain of translucent dew,
> Bathed in the hues of the great setting flame,
> Hesperus with the Host of Heaven came,
> And lo! Creation broadened to man's view;
> Who could have guessed such darkness lay concealed
> Within thy beams, O Sun? or who divined
> When bud, and flower, and insect lay revealed,
> Thou to such countless worlds hadst made us blind?
> Why should we then shun death with anxious strife?
> If Light conceals so much, wherefore not Life?

White, RICHARD GRANT, Shakespearian scholar, was born in New York, 22d May 1821, and died there, 8th April 1885. He graduated at New York university in 1839, next studied medicine, and then

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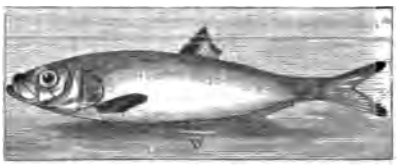
law, being admitted to the bar in 1845, but was finally drawn towards journalism. For fourteen years he contributed to the New York *Courier and Enquirer*, and during the civil war wrote a remarkable series of letters under the signature of 'A Yankee' for the London *Spectator*. He acted also for about twenty years as chief of the United States revenue marine bureau in the district of New York, resigning only in 1878. His acute criticisms in *Putnam's Magazine* on J. Payne Collier's famous folio MS. emendations of Shakespeare (1852) first revealed that intimate knowledge of Shakespeare which gave so much value to the succeeding books: *Shakespeare's Scholar* (1854), a complete annotated edition (12 vols. Boston, 1857–65), *Essay on the Authorship of the three parts of Henry VI.* (1859), *Memoirs of William Shakespeare* (1865), the 'Riverside Edition' of Shakespeare (3 vols. Cambridge, 1883), and the collected *Studies in Shakespeare* (Boston, 1885). Other works worthy of being named are *Words and their Uses* (New York, 1870), *The American View of the Copyright Question* (1880), *Everyday English* (1881), and *English Without and Within* (1881).

Whitebait, the name by which the fry of the Herring (*Clupea harengus*) and Sprat (*Clupea sprattus*) are known in the market, and when served for the table, especially in London. It was formerly regarded as a distinct species of the family Clupeidæ, and was called by Cuvier and Valenciennes *Rogenia alba*, by Yarrell and several other British naturalists, *Clupea alba*. Its true nature has long been definitely established, and it is by no means difficult to recognise in specimens of whitebait the characteristic specific characters of herring or sprat as the case may be. Whitebait



Whitebait.

fishing in the Thames is carried on chiefly from February to August, and it has been found that in February and March only 5 to 7 per cent. of the fish were herring-fry, 93 to 95 per cent. being young sprats, while in June and July the proportions were reversed, 75 to 87 per cent. being herrings, and the remainder sprats. The length of these little fish is from 1 to 3½ inches. The sprat spawns in the Thames from April to June, and the youngest fry, about two months old, are first taken in June. The smallest herring-fry in Thames whitebait are also about two months old, the larger as much as six months, while the largest sprats are probably nine months old. Whitebait are also taken in the estuary of the Forth between Alloa and Kincardine, and in the estuary of the Exe in Devonshire, but in the latter county such fry are locally known as *britt*. Whitebait are almost always taken in stow-nets or bag-nets, large funnel-shaped nets fixed to the rope by which the fishing-boat is moored. The boat is stationary in the tide-way, the fish are carried by the tide into the open mouth of the net, and collect in the small-meshed blind, or cod-end of the net. The fry of the herring and sprat occur in abundance at the mouths of rivers and in tidal estuaries wherever the adults are numerous in the neighbourhood. Shad-fry (*C. finta* and *alosa*) also sometimes occur with the young of sprats and herrings.

For the table whitebait (the *blanchaille* of English hotel *menus*) are fried with flour or crumbs; they are often laid on a napkin and sprinkled with fine flour and a little salt, rolled about till well covered with flour, and then thrown into a pot of boiling lard, where they remain till they are of a pale straw colour. Londoners resort to Greenwich and Blackwall to enjoy whitebait dinners. Towards the end of the 18th century it became the practice for the cabinet ministers to repair to Greenwich for a whitebait dinner every year before the prorogation of parliament in autumn —a practice revived by the Disraeli government in 1874 after its discontinuance by their predecessors, and since carried on with some intermissions. Some of the corporations of London indulge in a similar annual festivity, and the town-council of Exeter have also an annual dinner of which 'britt' is the characteristic feature.

Whiteboys. See RIBBONISM.

White Caps. See VIGILANCE SOCIETIES.

White Colours. See WHITE PIGMENTS.

Whitefield, or STAND, a town of Lancashire, 5½ miles N. of Manchester. Dating from 1826, it has many fine residences, cotton manufactures, and neighbouring collieries. Pop. (1891) 10,781.

Whitefield, GEORGE, one of the founders of Methodism, was born in the Bell Inn, Gloucester, 16th December 1714. He was the youngest of a family of six sons and a daughter, and he was but two when his father died. He had his schooling at St Mary de Crypt, Gloucester, next served about eighteen months as a drawer in his mother's public-house, and at eighteen entered as a servitor Pembroke College, Oxford. About three years earlier John and Charles Wesley had laid, in the university of Oxford, the foundations of Methodism (q.v.), and Whitefield ere long became conspicuous even amongst the young enthusiasts for zeal, for the austerity of his asceticism, and for labour too great for his strength among the sick and the prisoners in the gaol. His health gave way, but his native air soon restored him. His devotion and piety attracted the notice of Dr Benson, the bishop of the diocese, who gave him deacon's orders in June 1736. He preached his first sermon in Gloucester Cathedral with striking effect, next took his B.A. degree at Oxford, and preached in Bath, Bristol, London, and elsewhere.

Meanwhile Wesley had been in America establishing missions among the colonists, and in the beginning of 1738 Whitefield joined him in Georgia for a few months, returning to be admitted to priest's orders, and to collect funds for the establishment of an orphanage in Georgia. The religious level of the age was low, and the clergy were themselves supine, slothful, and worldly, hence Whitefield found amongst his brethren the most active opposition. But when the parish pulpits were denied him he preached in the open air, the first time with marvellous effect, on Kingswood Hill near Bristol, where the colliers heard him in thousands, the tears streaming down their grimy cheeks. From this time onwards he spent his life in constant travel and incessant preaching, everywhere moving audiences at his will by his irresistible earnestness and eloquence. Nor was it only the unlettered he could move, but critics so cold as Chesterfield, Bolingbroke, Hume, and Franklin.

About 1741 doctrinal differences on the question of predestination led to his separation from John Wesley—both of them being by this time disowned by the Established Church. Wesley took the Arminian view in the controversy; Whitefield adhered to a rigid Calvinism. After a short alienation the two friends were reconciled, and thenceforward their friendship was unbroken, although their ways led apart. Whitefield's

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supporters now built him a large shed at Moorfields —near Wesley's chapel—which being temporary was known as the Tabernacle; and his preaching gathered immense audiences around him. But he had no talent for organisation, and as soon as he went away on his frequent and protracted journeys his supporters began to disperse. Indeed he founded no distinct sect, his converts and adherents after his death either following the lead of the Countess of Huntingdon (q.v.) or joining other denominations, many in Wales becoming amalgamated through the guidance of Howell Harris into the body now known as the Calvinistic Methodists. The Countess of Huntingdon appointed Whitefield her chaplain, and built and endowed many chapels to maintain his Calvinistic doctrines.

Whitefield made no fewer than seven evangelistic visits to America, and the rest of his life was spent in preaching tours through England, Scotland, and Wales. In these he preached more than 18,000 sermons to ten millions of people. One of the most famous of these missionary journeys was that which he made to Scotland in 1741. He went thither on the invitation of Ralph and Ebenezer Erskine; but his notions were too catholic for his friends, who were disgusted when they found him as ready to preach in a parish church as to a seceding congregation, and more ready still to preach in the open air. At Cambuslang, in Lanarkshire, his preaching produced one of the most remarkable revivals of modern times; many thousands were stricken with concern about their souls, and found expression for their excitement in violent physical manifestations. It was on his return from this visit that Whitefield met and married a Welsh widow, Mrs James (November 1741). Southey asserts his marriage was not a happy one, but offers no proof; Cornelius Winter, who knew her more than a year before her death, says 'Whitefield was not happy in his wife . . . Her death set his mind much at liberty.' Whitefield set out for America for the last time in 1769. He was ailing at the beginning of the voyage, he was ill at the end of it, and he died somewhat suddenly not long after his arrival in America at Newburyport, near Boston, 30th September 1770.

Whitefield was above the middle size, and of well-proportioned figure. His eyes were dark blue, but were disfigured by a slight squint. His gestures were natural and effective, but his greatest gift was his marvellous voice, clear, full, and musical—capable of reaching 20,000 men on a hillside. His writings by no means correspond with his fame—indeed nothing he has left behind is more than commonplace. The explanation of his unexampled power over his hearers must be sought in the burning earnestness and reality of his faith, the fluency and strength of his language, and that vehemence and impetuosity of nature characteristic of the orator, as well as in the spiritual deadness of the time and the inherent fitness of his subject to the needs of the human heart.

His collected works—about 75 sermons, journals, and letters—together with the *Memoirs* by Dr Gillies, fill 7 vols. (1771–72). There are also Lives by Robert Philip (1838), J. R. Andrews (1864), D. A. Harsha (Albany, N.Y., 1866), but especially the Rev. L. Tyerman (2 vols. 1876). See also the *Life and Times of the Countess of Huntingdon* (2 vols. 1840), and Stevens, *History of the Religious Movement of the 18th Century called Methodism* (New York, 1859–62).

Whitefish (*Coregonus clupeiformis*), the Common Whitefish, is the largest of all the Coregoni or American lake whitefish. It is very highly esteemed for food, ranking, indeed, as one of the finest of table fishes. Its range extends from Lake Champlain to the Arctic Circle. See COREGONUS.

Whitehall, a town of New York, at the head or southern extremity of Lake Champlain, and termination of the Champlain Canal, 78 miles by rail N. by E. of Albany. It has sawmills and a trade in lumber. Pop. 5346.

Whitehaven, a seaport of Cumberland, near the point where the Solway Firth merges in the Irish Sea, 38 miles SW. of Carlisle and 80 NW. of Lancaster. Dating from 1633, it has owed its well-being to great collieries—some of them extending beneath the town and under the sea—and to the wealth of hæmatite iron ore found in the neighbourhood. There are blast-furnaces, iron-shipbuilding yards, iron and brass foundries, and manufactures of coarse linen, sailcloth, ropes, soap, and earthenware. The harbour has a wet-dock of five acres, two piers constructed in 1824–41, and each over 300 yards long, and a lighthouse; and steamers ply to Liverpool, Dublin, Belfast, and Ramsey. Whitehaven was attacked by Paul Jones (q.v.) in 1778, and suffered from a mining subsidence in 1791. It was made a parliamentary borough, returning one member, in 1832. Pop. (1851) 18,916; (1891) 18,044.

Whitehead, CHARLES, greatest poet of the name and the writer of at least one good novel, was born in London in 1804, the son of a prosperous wine-merchant. At first a clerk, he gave himself entirely to the life of letters soon after publishing *The Solitary* (1831), a poem of reflection of real promise. His *Autobiography of Jack Ketch* (1834) showed humour, and led to his being asked by Chapman and Hall to give them a popular humorous book in regular instalments. Fortunately for the world he declined, recommending to the publishers the young Dickens, who thus began the famous *Pickwick Papers*. His novel *Richard Savage* (1842) earned and deserved the praises of Dickens and Rossetti. Other works are the *Cavalier*, a poetic drama; the *Earl of Essex*, a historical romance (1843); *Smiles and Tears*, a collection of essays and stories (1847); and a *Life of Raleigh* (1854). Whitehead unfortunately fell into intemperance, went out to Melbourne to start afresh in 1857, but again sank, lost his wife, and died miserably in 1862, leaving unfinished the *Spanish Marriage*, a promising poetical drama. See *A Forgotten Genius*, a monograph by H. T. Mackenzie Bell (1884).

Whitehead, PAUL, 'a small poet' in Johnson's phrase, was born a tailor's son in Holborn, February 6, 1710, was apprenticed to a mercer, married a short-lived imbecile with a fortune of £10,000, lay some years in the Fleet for the non-payment of a sum for which he had stood security, became active in politics and as a poetical satirist, was one of the infamous monks of Medmenham Abbey (q.v.), became deputy-treasurer of the Chamber, and died 30th December 1774. The only satires of his that need be named are *State Dunces* (1733), inscribed to Pope, and *Manners* (1739), for which Dodsley was brought before the House of Lords. 'Whitehead, who,' says Johnson, 'hung loose upon society, skulked and escaped.' His writings were collected by Captain E. Thomson in 1777, but Churchill's couplet best preserves his name:

> May I (can worse disgrace of manhood fall?)
> Be born a Whitehead and baptised a Paul.

Whitehead, WILLIAM, Colley Cibber's successor as poet-laureate, was born a baker's son at Cambridge in 1715. He was helped to an education at Winchester and Clare Hall, Cambridge, and was elected fellow of his college in 1742. He made the grand tour as tutor to Lord Jersey's son, and by the family influence became in 1755 secretary and registrar of the Order of the Bath, and in 1757 poet-laureate. He died April 14, 1785. He

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wrote tragedies, elegies, comedies, farces, epistles, and all manner of other poems long quite forgotten, and deservedly. His poems were collected in 1754, and in 1774 in two volumes—a third volume, with a memoir by W. Mason, followed in 1788.

White Horse, the name applied to a figure of a horse on a hillside, formed by removing the turf so as to show the underlying chalk. Most of these figures are in Wiltshire, but Berkshire possesses the most famous of them all, that at Uffington, 4 miles SE. of Shrivenham. It measures 355 feet from nose to tail, and 120 from ear to heel; is traditionally supposed to commemorate Alfred the Great's victory of Ashdown (871); is mentioned about the reign of Henry II. as existing prior to 1084; and has been periodically 'scoured'—fourteen times between 1755 and 1857, and then not till 1884. The next most famous White Horse, that on Bratton Hill, near Westbury, is likewise said to commemorate a victory of Alfred's, that of Ethandun (878). It originally measured 100 by 54 feet, but now is 175 by 107, having been recut in 1778 and 1853. Other White Horses are those of Cherhill (1780; 129 × 142 feet), Marlborough (1804; renewed 1873; 62 × 47 feet), Pewsey (1812; 180 × 167 feet), Broad Hinton (1835; 90 × 90 feet), and Wootton Bassett (1864; 86 × 61 feet). Yorkshire has two White Horses, both modern—on Roulston Hill, near Northwaite, and the Hambledon Hills, near Thirsk; and on Mormond Hill, Aberdeenshire, are both a White Horse (18th century; 162 × 126 feet) and a stag (1870; 240 feet long). At Tysoe, Warwickshire, is a Red Horse (1461; 54 × 31 feet); near Weymouth is an equestrian figure of George III.; and similar figures of seeming antiquity are the Giant (180 feet long) on Trendle Hill, near Cerne-Abbas, Dorsetshire; the Long Man (240 × 148 feet) at Wilmington, Sussex, re-outlined in 1874; and the Cross (230 × 340 feet) at Whiteleaf, Bucks.

See the Rev. W. C. Plenderleath, *The White Horses of the West of England* (1885; new ed. 1892); Chambers's *Book of Days*, vol. ii. p. 778; and T. Hughes's *Scouring of the White Horse* (1858).

White Lady, a spectral figure which, according to popular legend, appears in many of the castles of Germany, as at Berlin, Neuhaus in Bohemia, Ansbach, Baireuth, Kleve, Darmstadt, Altenburg, as also in London, Copenhagen, Stockholm, and elsewhere, by night as well as by day, particularly when the death of any member of the family is imminent. She is regarded as the ancestress of the race, shows herself always in snow-white garments, carries a bunch of keys at her side, and sometimes rocks and watches over the children at night when their nurses sleep. The earliest historical instance of this apparition occurred in the 15th century, and is famous under the name of Bertha of Rosenberg (in Bohemia). The White Lady of other princely castles was identified with Bertha, and this was accounted for by the intermarriages of other princely houses with members of the house of Rosenberg. In the Schloss of Berlin she was seen in 1598, 1619, 1667, 1688, and again in 1840, 1850, and 1879. The White Lady of Avenel, in Scott's *Monastery*, is an ineffective imitation. It was long a common belief in the Highlands that many of the chiefs had some kind spirit to watch over the fortunes of their house. Popular tradition has many well-known legends about white ladies, who generally dwell in forts and mountains as enchanted maidens waiting for deliverance. They delight to appear in warm sunshine to poor shepherds or herd-boys. They are either combing their long hair, or washing themselves, drying wheat, beating flax, or spinning; they also point out treasures and beg for deliverance, offering as reward flowers, corn, or chaff, which gifts turn in the instant into silver and gold. They wear snow-white, or half white half black garments, and yellow or green shoes. All these and many other traits that appear in individual legends may be traced back to a goddess of German mythology who influences birth and death and presides over the ordering of the household. Still more distinctly the appellation White Lady and the name Bertha point back to the great goddess of nature, who appears under various names, and who, as *Berhta* ('the brilliant'), held her circuit on Twelfth-night and revealed her power. When the legend goes on to say that the Bohemian Bertha of the 15th century promised the workmen of Neuhaus a sweet soup on the completion of building the castle, and that this soup, along with carp, is still given in remembrance of it to the poor on Maundy Thursday, we may be permitted to recognise again the festival dishes consecrated to Berhta, such as fish, oatmeal gruel or dumplings, &c., which it is still customary to eat about the time of Twelfth-night and Christmas in most districts of Germany.

See Minutoli, *Die Weisse Frau* (Berl. 1850), and Schrammen, *Die Schicksals- oder Totenfrau im Haus der Hohenzollern* (Cologne, 1888).

White Lead. See LEAD.

White Leg (also called 'Milk-leg': technically *phlegmasia dolens*), an ailment of women, usually soon after parturition. There is swelling of the leg, hardness, whiteness of the skin, and thrombosis of the large veins.

Whitelocke, BULSTRODE, was born in London 2d August 1605, and educated at Eton, Merchant Taylors' School, and St John's College, Oxford. The son of a judge, he studied at the Middle Temple, sat in the Long Parliament for Great Marlow, and took a half-hearted part on the popular side in the great struggle. In 1648 he was appointed one of the commissioners of the Great Seal. He would take no part in the king's trial, but he accepted a seat in the council of state, and was sent by Cromwell ambassador to Sweden (1653). He declined Cromwell's title of viscount, was nominated by Richard keeper of the Great Seal, but again steered prudently enough through that intricate period to be included in the Act of Oblivion. He died in 1675 at his house at Chilton in Wiltshire. Whitelocke's *Memorials* was first published in 1682 in a mutilated and falsified form, the anonymous editor, according to Wood, being Arthur, Earl of Annesley. A more satisfactory edition was that of 1732. The book is reliable, but Mr Gardiner thinks the earlier part to have been written from memory, and so defective with the inevitable defects of such a method. His *Journal of the Embassy to Sweden* was edited by H. Reeve (1855). See his *Memoirs* by R. H. Whitelocke (1860).

White Mountains, a group belonging to the Appalachians (q.v.), in New Hampshire (q.v.). Mount Washington has a practicable carriage-road and a hotel on its summit, with a powerful electric light.

White Pigments. The most important of these is *white lead*, which not only is very serviceable when used alone as a white colour, but in oil-painting most other colours are mixed with it to give them body. Commercial white lead is frequently mixed with sulphate of baryta (barium sulphate), but manufacturers of white lead object to this being called an adulteration, as the mixture is sold by them as such. Less common adulterations are Gypsum (q.v.), chalk, and china clay. *Flake White* is a pure white lead specially prepared for artists, and keeps its colour better than the kind commonly used by house-painters (see LEAD, and PIGMENTS). *Zinc White*, or oxide of zinc, is

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not so much used for artistic work in oil as flake white, but in house-painting it is often coated over a ground of white lead, zinc white not being liable to change by the action of sulphuretted hydrogen. As an oil-colour it wants body, and is a bad dryer. As a water-colour, under the name of Chinese white, it is very useful and permanent. *Baryta White, permanent white*, is the sulphate of baryta, and is best when artificially prepared. This pigment does not change in impure air, but is not much in favour for oil-painting, except to mix for some purposes with white lead, as it renders it less liable to alter in tint. White pigments are numerous, but these three are by far the most important.

White River rises in Arkansas, flows north-east into Missouri, then east, south-east, and south through Arkansas, and empties itself into the Mississippi near the mouth of the Arkansas. It is 800 miles long, and navigable 300 miles.

Whites. See LEUCORRHEA.

White Sea (Russian *Bjeloje More*), a branch of the Arctic Ocean extending into the provinces of Archangel in the north of Russia. About 100 miles wide between the Kaninskaia and Kola peninsulas, it narrows to less than 50 farther south, widens again and forms three gulfs, the Kandalak Gulf, that of Archangel, into which the Dwina falls, and that into which the Onega falls. The sea-route hither was discovered by Chancellor in 1553; Archangel (q.v.) is the chief emporium on its shores. It is usually frozen from the beginning of September till the end of May; and even during the other months, when navigation is possible, it is not free from floating ice, and heavy fogs are frequent. The area is about 50,000 sq. m. By canals connected with the Dwina, it has direct water communication with the Dnieper and the Volga, and so with the Black Sea and the Caspian.

White Sulphur Springs, a watering-place of West Virginia, 227 miles by rail W. of Richmond. It was at one time the most popular summer-resort in the southern states, lies amid fine mountain scenery, and contains several large hotels.

White Swelling, a disease of the Joints (q.v.), in which the synovial membrane passes into pulpy degeneration.

Whitethroat (*Sylvia cinerea*), a bird of the family Sylviidæ, a summer visitant to the British Isles; plentiful during summer in the greater part of England and in Ireland, but rarer in the north of Scotland, where, however, it is also extending its range, breeding regularly as far north as the Dornoch Firth. It is also common during summer in the south and middle of Europe, and is found even in the north. It places its nest in a low bush, or among a tangled mass of brambles and weeds. Its food consists of insects, berries and other fruit. Its song is not very sweet, but is delivered with great energy, and it seems to vie with other birds in singing, refusing to be outdone. It is very lively and amusing as a cage-bird, and very easily tamed. The whole length of the whitethroat is 5½ inches. Its plumage is brown of various shades; the breast and belly brownish white, tinged with rose-colour in the male. The Lesser Whitethroat (*Sylvia curruca*) is a species of much rarer occurrence, and less extensive in its distribution in the British Isles. Whitethroats belong to the same genus as the Blackcap (q.v.) and the Garden Warbler (*S. hortensis*), which is not uncommon in Britain, and almost rivals the blackcap in the richness of its notes, at the same time being apparently intolerant of rivalry, for it avoids the blackcap's haunts.

Whitethroat (*Sylvia cinerea*).

White Vitriol. See ZINC.

Whitewash, slaked quicklime, reduced to the consistency of milk by means of water. It is used for colouring walls, and as a disinfectant. If merely for colouring, a little size is added, but not when used for sanitary purposes.

Whitgift, JOHN, Archbishop of Canterbury, was born a merchant's son at Great Grimsby, Lincolnshire, in 1530 or 1533. He was brought up at Wellow Abbey, near Grimsby, where his uncle was abbot, and at St Anthony's School in London, and in 1549 entered Queen's College, Cambridge, but migrated next year to Pembroke Hall. In 1555 he was elected a fellow of Peterhouse, and, protected by its master during the Marian persecution, took orders in 1560, and from the Bishop of Ely, to whom he was chaplain, received the Cambridgeshire rectory of Teversham. He became successively Lady Margaret professor of Divinity (1663), Master of Pembroke, a queen's chaplain, a D.D., regius professor of Divinity, and Master of Trinity (1567), Dean of Lincoln (1571), Bishop of Worcester (1577), Archbishop of Canterbury (1583), and a privy-councillor (1586). Several of these offices he held conjointly, for he was a great pluralist. Having attended Queen Elizabeth in her last moments, and crowned James I., he died at Lambeth, 29th February 1604, and was buried at Croydon, where in 1596 he had founded an almshouse. With a decided Calvinistic bias, Whitgift yet was a steadfast champion of conformity, and in his controversy with Thomas Cartwright (q.v.) is held to have vindicated the Anglican position against the Puritans with no less ability than Jewell showed in defending it against the Romanists. Stow, Camden, Wotton, and Fuller concur in their praise of Whitgift, and it was reserved for Macaulay to stigmatise him as 'a sycophant and oppressor.' His works were edited for the Parker Society by the Rev. John Ayre (3 vols. 1851–53).

See vol. ii. of Cooper's *Athenæ Cantabrigienses* (1861) for a bibliography of his ninety-four writings and for a long list of authorities, to which may be added vol. v. of Hook's *Lives of the Archbishops of Canterbury* (1875).

Whithorn, a royal burgh in Wigtownshire, 3¼ miles NW. of the Isle of Whithorn, 12¼ miles S. of Wigtown by rail. Pop. (1851) 1652; (1891) 1403. Ptolemy makes mention of the place as *Leukopibia*, a town of the Novantæ—the name most likely synonymous with the Latin *Candida Casa*, the Old English *Hwit-aern*. Here at any rate St Ninian (q.v.) founded *Candida Casa* or church of Whithorn, dedicating it to St Martin, who had just died (397), and here he was buried in 432. From this place the monastery of Rosnat spread the light far and wide, and here a bishopric was founded by the Angles in 727, which was, however, removed in 796. At length under David I. Fergus, lord of Galloway, re-established the see of Galloway, founding here also a Premonstratensian priory, whose church became the cathedral. In early times pilgrimages were made hither from all parts of Scotland; James IV. came at least once a year, and we find Margaret, queen of James III., visiting it in 1473, and James V. in 1532 and 1533. Here in 1514 died the aged Earl of Angus, 'Bell-the-Cat.' There remains now only a mere, roofless, ivy-grown ruin.

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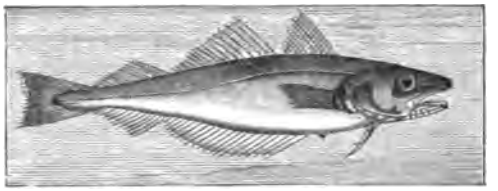
Whiting (*Gadus merlangus*, Linn.), a species of fish of the family Gadidæ. Like the cod, haddock, pout, and poor cod, this species has the upper jaw longer than the lower, but it is distinguished among the species possessing this character by the fact that it has no barbule on the chin. Other specific characters are the pellucid silvery colour of the sides, the presence of a dark mark at the base of the pectoral fin, and the white



Whiting (*Gadus merlangus*).

border of the ventral and dorsal fins. The posterior edge of the tail is straight or but slightly emarginate, the depth of the body moderate; the anus is situated beneath the middle of the dorsal fin. As in all species of Gadus there are three dorsal fins and two ventral. The scales are small. The range of the whiting is the European coast from Scandinavia to the Mediterranean. It is abundant on British coasts, especially on the south and west coasts of England and Ireland, comparatively rare on the northern coasts of Scotland. It has been recorded as large as 16 inches in length and 3 to 4 lb. in weight, and some specimens are said to have reached 8 lb., but the usual size is about 1 or 2 lb. It is a voracious fish, feeding both on the bottom on crustacea and in midwater on small fish, such as sprats, young pilchards, &c. It also feeds on molluscs and worms, but to a less extent. It is caught both by the trawl and by hand-lines, and in Scotland also by long-lines. In Scotland mussels are chiefly used as bait; in England, pilchard, squid, herring, or mackerel.

The whiting breeds in spring, from March to May; the eggs, as in other Gadidæ, are transparent and buoyant and dispersed separately in the water. It is in high esteem for the table, and is regarded as particularly delicate and easy of digestion. The flesh is of a pearly whiteness, whence the English name. It very soon suffers change, however, and is in good condition only a short time after being caught; but great numbers of small whitings are sent to market, salted and dried, under various names.

Whiting is simply chalk ground and washed to separate impurities. It is extensively used as a size-colour, for cleaning silver and other metals, as well as glass, and in preparing frames for gilding; and (in milk) may be used as an antidote to poisoning by oxalic acid. It is often mixed with white lead as an adulterant.

Whitlow, or PARONYCHIA, is a painful inflammatory affection of the fingers, almost always proceeding to suppuration. There are several varieties of this affection, according to the texture primarily attacked; thus, it may be situated in the skin, the cellular (or connective) tissue beneath the skin or under the nail, the tendons or tendinous sheaths running along the fingers, or the periosteum. If the skin be the seat of inflammation vesicles appear, which soon discharge pus, after which relief is rapidly afforded. Such cases require little care or attention, and give rise to hardly any constitutional disturbance. If the cellular tissue be the primary seat of inflammation there is a painful sensation of tenseness and throbbing of the part, and often considerable febrile disturbance, until the pus can be evacuated. Although this form is painful no serious mischief is to be apprehended. When, however, the tendons and their sheaths, or the periosteum, are affected, a much more serious form of whitlow is developed, which has been already discussed in the article TENDON. In this form the suppuration may extend up the arm and occasion destruction of the joints, and even death.

Whitlow may originate either spontaneously or after an external injury, such as a prick from a needle, thorn, &c. In the treatment of the milder forms the finger or thumb should be held for half an hour or longer in water as hot as can be borne, or enveloped in an antiseptic poultice. When matter shows itself, an incision should be made to admit of its escape. Even if suppuration has not taken place, a free incision into the inflamed part often gives great relief, and much limits the extension of the inflammation.

Whitman, WALT, the unique poetic celebrant of Democracy, the Pindaric laudator of the 'average man,' was born, of mingled English and Dutch stock, on 31st May 1819, at West Hills, Long Island, in New York state, and died on 27th March 1892. Like many another man of genius Whitman seems to have owed little to his formal education, as he left school at the age of twelve to serve first in a lawyer's and then in a doctor's office, and finally in a printer's as an apprentice or learner. But that he profited by such schooling as he had (in the public schools of New York state) is shown by the fact that his next employment was that of itinerant teacher in country schools. He returned shortly to his printing, with spells of summer holiday and even farm-work, and in 1846 became editor of the *Brooklyn Eagle*. This and his other numerous press engagements were only of short duration, a certain restlessness, love of wandering, and eagerness for fresh experiences making him pass rapidly from one post or employment to another. He even built and sold houses at one time, and was in serious peril of growing wealthy on the proceeds, a peril he was zealous and successful in avoiding. All along haunted by the yearning and sense of obligation to produce a life-work, Whitman seemed quite unable to find full and free expressions for his emotions and thoughts until he hit upon the curious, irregular, recitative measures in which he composed the *Leaves of Grass*. When first issued in 1855 this unique publication was but a small quarto of 94 pages, but it grew in the course of the seven succeeding editions till it contained nearly 400 pages. The later and complete editions, taken together with his prose book *Specimen Days and Collect*, may be held to embrace the life-work of Whitman as a writer. But Whitman least of all men was content with an idle and remote spectatorship of life; he was ever bold and determined to face and grapple with life's saddest and sternest realities, to put the full strength of his shoulder to the burden of his fellows. Thus it came that summoned to tend his own brother, wounded in the war against the South, he became the brother-nurse to every wounded or sick mother's son in the Northern army. Not Florence Nightingale's self could be more tender and more beloved than the stalwart, bearded Walt, passing like a broad sunbeam from bedside to bedside in the long hospital wards, with cheery words and helpful offices to the living and last hand-clasp and brotherly kiss to dying comrades. The exertion, the exposure, and the high nervous and emotional strain Whitman underwent in these few years left him a shattered and almost aged man. About the close of the war he received (the magnificent reward of devotion and genius) a subordinate clerkship under government, and was summarily dismissed by Secretary

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Harlan as the author of 'an indecent book;' though he fortunately obtained a similar post almost immediately. In 1874 he left Washington for Camden, New Jersey, where he lived till his death. Partially paralysed as he now was, Whitman was in no small danger of falling into absolute poverty, had it not been for the timely help of his admirers beyond the Atlantic, a movement in which Tennyson, Carlyle, and Ruskin and other leading authors took generous and active part. Later on several wealthy American citizens honoured themselves and their country by liberally providing for the aged poet's simple wants.

All the auspices seem in favour of Whitman's immortality: the neglect of his own countrymen, tempered only by ridicule, abuse, and even persecution; the recognition by a few of the leading minds of Europe and America; his slow emergence into acceptance and appreciation if not into popularity; all these seem auguries of a true man of genius. Although Whitman, like Carlyle and Browning, may be a dangerous and dangerously easy model for disciples to imitate, he undoubtedly worked out for himself a style of distinction as notable as theirs. This in itself is a title to fame, or at least a charm against oblivion, even though his style, like that of Lyly, runs to extremes and vices. This style or form is a sort of rhythmic recitative or irregular chant, the precursors of which may be found in the English translation of the Psalms and other Biblical poems, in Macpherson's *Ossian*, and in the later poems of William Blake. These chants vary in movement, and seem governed by laws rhythmic rather than metric, which (like the grammar of an unwritten tongue) have never been formulated even by the inventor himself. They have a peculiar, wild, stirring charm, which is apt to make regular verses seem tame and insipid after them. As to subject, Whitman set himself the Atlantean task of uplifting into the sphere or dominion of poetry the whole of modern life and man, omitting nothing, concealing nothing. Like Wordsworth, he would sing 'man as man,' only with a far wider and bolder sweep of subject and greater daring of treatment. His thesis is that of St Peter's vision; 'there is nothing common or unclean.' Hence the logical necessity with Whitman to include the treatment of subjects which in modern society were tabooed as obscene and unmentionable; hence too the accusations of indecency, so just and pertinent from the accuser's point of view, so futile and irrelevant from that of the accused. Whitman is in fact an idealist who has bound himself by a solemn vow to be a thorough-going realist; and it is his resolute and often successful endeavour to secure this union that gives his work its exceptional artistic quality. He is a prince of impressionists in literature. But so high and hard is the task Whitman sets himself that it is no matter of surprise that he sometimes, if not often, fails, and from heights where he was approaching the sublime falls perilously near the ridiculous. It is the fate of all artists who strive for the highest things that their failures—often only apparent—are more easily detected than their solid achievements; hence the contumely and ridicule that a Turner or a Wordsworth, Keats, or Landor, or Shelley suffers at the hands of a clever but uninitiated criticism. So largely with Whitman; but it is better to approach him in the same spirit that he has shown toward man and nature, that of for ever seeking for what is great and good, while outfacing steadily and bravely every stern and refractory reality.

Whitman's *Leaves of Grass* fell still-born from the press, but in England, of some copies sold in 1865 by a book-pedlar at Sunderland, one was given to W. Bell Scott, who in turn sent one to W. M. Rossetti (see *Athenæum* for 9th April 1892). A selection from Whitman was published by Mr Rossetti in 1868 (new ed. 1886); another in 1886 by E. Rhys. See W. D. O'Connor, *The Good Grey Poet*—a name by which Whitman liked to be called—(1866); Burroughs, *Notes on Whitman* (1866); and monographs by Dr Bucke (1885) and W. Clarke (1892).

Whitney, Eli, American inventor, was born at Westborough, Massachusetts, December 8, 1765, and was educated at Yale College, where he paid his expenses partly by school-teaching, partly by mechanical labour. Having graduated in 1792, he went to Georgia as a teacher, but finding a generous patron in the widow of General Greene, of the Revolutionary army, he resided on her estate and studied law. The cotton culture at this period, especially that of the best kind, the 'green seed,' was limited by the slow and difficult work of separating the cotton from the seed by hand. Whitney set to work to remedy this under great disadvantages, for he had to make his own tools; but the reports of his success prompted some lawless people to break into his workshop and steal his machine, and get others made before he could secure a patent. He, however, formed a partnership with one Miller in 1793, and went to Connecticut to manufacture cotton gins; but the lawsuits in defence of his rights carried off all his profits and $50,000 voted him by the state of South Carolina. Finally in 1798 he got a government contract for the manufacture of firearms, and was the first to effect the division of labour by which each part was made separately. He made a fortune by this manufacture, carried out with ingenious machinery at Whitneyville, Connecticut; while he had but barren honour from the gin, one of the most important of the whole series of inventions connected with the cotton manufacture. He died at New Haven, January 8, 1825. See Cotton, p. 510.

Whitney, Josiah Dwight, geologist, was born in Northampton, Massachusetts, 23d November 1819, graduated at Yale in 1839, and the year after joined the survey of New Hampshire. The years 1842–47 he spent in study in Europe, returning to explore, together with J. W. Foster, the Lake Superior region. Their *Synopsis* of the explorations was published in 1849; their *Report* on the geology, 1850–51. Whitney next spent two years travelling in the states east of the Mississippi, of which the fruit was *The Metallic Wealth of the United States* (1854). Appointed state chemist and professor in the Iowa state university in 1855, together with James Hall, he issued the *Reports* on its geological survey (1858–59); and in 1858–60 took part in the survey of the lead region of the upper Missouri, publishing, again with Hall, his *Report* (1862). He was appointed state geologist of California in 1860, and laboured on the survey of that state till 1874, publishing in six volumes his *Geological Survey of California* (1864–70). In 1865 he was appointed to the chair of Geology at Harvard, received the LL.D. degree from Yale in 1870, and has had the honour of giving his name to the highest mountain in the United States. His *Yosemite Guidebook* was published at San Francisco in 1869.—His brother, William Dwight Whitney, philologist, was born in Northampton, Massachusetts, 9th February 1827, graduated at Williams in 1845, and was three years thereafter clerk in a bank, studying Sanskrit the while. In 1849–50 he studied at Yale, then went to Germany, studying at Berlin under Bopp and Weber, and at Tübingen under Roth, with whom he prepared an edition of the *Atharva Veda Sanhita* (Berlin, 1856). In 1854 he was appointed professor of Sanskrit at Yale, in 1870 also of Comparative Philology. He received the degrees of Ph.D. from Breslau (1861), LL.D. from Williams (1868), Harvard (1876), St

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Andrews (1874), Edinburgh (1892), and Litt.D. from Columbia (1886). A member of the American Oriental Society from 1849, he was its librarian (1855–73), its corresponding secretary (1857–84), and since then its president. His contributions to its *Journal* have been no less numerous than important, including a translation of the *Sûrya Siddhânta* (1860); text with notes of the *Atharva Veda Prâtiçâkhya* (1862); the text with notes of the *Taittirîya Prâtiçâkhya* (1871), which was awarded the Bopp prize by the Berlin Academy as the most important Sanskrit publication of the preceding three years; and the Index Verborum to the *Atharva Veda* (1881). He contributed also to the great Sanskrit dictionary of Böhtlingk and Roth (7 vols. St Petersburg, 1853–67). Professor Whitney is undoubtedly one of the foremost Sanskrit scholars of the day, and his eminence has been recognised by his rank as a correspondent of the Berlin, Turin, Rome, and St Petersburg academies, the Institute of France, and as a foreign knight of the Prussian order 'Pour le Mérite.' As a scientific philologist he belongs to the school that ascribes the development of speech to the acceptance of conventional signs, its origin imitative rather than an intuitive concomitant of thought. He has waged warfare with Max-Müller on fundamental questions of the science of language, and those interested in such controversies will find the European scholar's onslaught on Whitney at length in the fourth volume of his *Chips from a German Workshop* (1875).

Other works of Whitney's are *On Material and Form in Language* (1872); *Darwinism and Language* (1874); *Logical Consistency in Views of Language* (1880); *Mixture in Language* (1881); compendious German *Grammar* (1869), *Reader* (1870), and *Dictionary* (1877); *Oriental and Linguistic Studies* (1873–75); *Life and Growth of Language*, in International Science Series (1876); *Essentials of English Grammar* (1877); *Sanskrit Grammar* (1879); *Practical French Grammar* (1886). He was also editor-in-chief of the great *Century Dictionary* (6 vols. New York, 1889–91).

Whitney, MOUNT, the highest mountain of the United States outside of Alaska, is in the Sierra Nevada in southern California, and has a height of 14,898 feet.

Whitstable, a long, straggling village in Kent, on the south shore of the Thames estuary, at the mouth of the Swale, 6 miles NNW. of Canterbury. It is famous for the delicacy of its oysters, the large artificial beds being regularly farmed by different companies and proprietors. Pop. of parish, 5000.

Whitsunday. See PENTECOST. In Scotland it is one of the usual Terms (q.v.) for regulating the letting of houses and farms—its connection with the Sunday of Whitsuntide or with any Sunday having wholly passed from the popular consciousness. It was formerly movable, but was fixed in 1690 to mean the 15th May. In many respects local usage used to overrule the statute. Thus, in Edinburgh, the term of entry to a house was the 25th May until 1881, when by an act for Scotland it was declared to be the 28th; but rents are payable on the 15th.

Whittier, JOHN GREENLEAF, the sweet American 'Quaker poet' and sturdy abolitionist, was born near Haverhill, Massachusetts, on the 17th December 1807, belonging thus to the same golden decade that gave Emerson and Longfellow to America, Tennyson and the Brownings to England. The son of a poor farmer, who was also shoemaker, young Whittier obtained his formal education only with that struggle which seems so much better to foster genius than the possession of all the advantages, as they are called. While the bodily frame that so well served him till his peaceful decease on the 7th of September of 1892 was developed and hardened by his healthy, if arduous, outdoor life, his observation was roused and quickened, his imagination fired and coloured by the shining pages of nature's volume spread out continually before him. He wandered the New England meadows with the voices of Burns and Wordsworth for ever in his ears. He had, too, a notable schoolmaster in Joseph Coffin, an enthusiastic collector of all local legends and antiquities, thus adding to wild nature the weirder interest of strange, dark, and thrilling human deeds and dread-born superstitions. For his technical education, for better or worse, Whittier was apprenticed to journalism, beginning with contributions to the 'Poet's Corner' and as early as 1829 undertaking the editorship of the *American Manufacturer*, and in 1830 that of the *New England Weekly Review*, published at Hartford, Connecticut. His next move was a return to his native town to a similar post on the *Haverhill Gazette* in 1832, after having published in the previous year *Legends of New England* and *Moll Pitcher*. Long before this his poetry had attracted the admiration of William Lloyd Garrison, the champion of 'Abolition,' who rode over from Newburyport to see Whittier when quite a lad, and became his life-long friend. So it fell out that, if Garrison may be called the preacher or prophet, Whittier must be wreathed the poet-laureate of abolition (even though Emerson has touched the subject with more puissant pen). Thenceforward, whether with the bright flashing blade of his noble poetic rhetoric or the sounding quarter-staff of his earnest and manly prose, he fought the long, hot, dangerous battle of emancipation through contempt and defeat to lasting and complete victory. Apart from this strenuous and heroic struggle there is nothing epoch-making in Whittier's life literary or personal. In 1840 he settled in the quiet of Amesbury, a village near his birthplace.

Of Whittier's collected prose works it may be said generally that the historical interest is stronger than the literary; for his prose never rises to the high levels of his poetry, and its main interest lies in the fact that in it we have the work, we may almost say the life-work, of a very earnest and excellent man. The contents of these volumes consist chiefly of articles which have long since served their purpose; and as permanent contributions to literature they lack the masterly style which has in some instances rendered immortal what would otherwise be of but transient interest. Beyond the Atlantic the name abolitionist has never probably obtained the credit that was due to it, mainly because it was hard for an Englishman to realise the high moral and physical courage which the man or the woman must have who passed by that name, not in the slave states merely, but in the North itself, fated though the North was to fight and bleed and conquer in that very cause.

Whittier's claim to immortality lies clearly in his poetry, and there in very small bulk. His anti-slavery poems have for the most part served their purpose, and with some few exceptions, such as the pathetic and spirited 'Slaves of Martinique,' can hardly be of enduring interest. His nature poetry is faithful, fresh, and beautiful, without being quite original, and his ballads of moral heroism, 'Barclay of Ury' and 'Barbara Frietchie,' if a little wanting in pith and sustained force, rank high among poems of that class; but it is when he soars into the spiritual and even mystic spheres, as in 'My Psalm,' that, rising lark-like, his notes come clearest, sweetest, and truest. At lower levels his note is often less certain or even is often ill-sustained. Concerned rather with the feelings and thoughts (neither of them very

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remarkable) which he desires to express than with poetic form, he lacks the true enthusiasm of the artist for the *technique* of his work; hence blemishes are often only too patent. Whittier had not, in fact, the quality of originality of the first order nor of that expansiveness which itself becomes the equivalent of originality. No man could be more faithful to his principles, more true to his conscience, and more single in his aspirations towards what was right; no man could cherish through a long life a faith more simple and exalted, or declare with more clearness and insistence his high spiritual message. All these things make a man good and great; they leave him with a lasting influence over kindred minds; but they alone will hardly secure him immortality as a great writer or cause him to take rank among the real thinkers of his age. What will longest remain to us will be the record of a long, pure, and blameless life, and a few of his poems in which, as by a rare and happy fortune, the outbreathings of a sweet and exalted spirit have come to us in a form as exalted and as sweet.

A final edition of Whittier's poems revised by himself appeared in 7 vols. (1888–89). A new volume, *At Sundown*, was announced after his death. See Lives by Underwood (1875; new ed. 1883) and W. S. Kennedy (1882).

Whittington, RICHARD, the pattern for all ambitious prentices yet to be, is supposed to have been born like other boys about 1358, youngest son of Sir William Whittington of Pauntley in Gloucestershire. His father dying, Richard set out for London at thirteen to push his fortune, and apprenticed himself to Sir John Fitz-Warren, a prosperous mercer, whose daughter he afterwards married. We find him a member of the Mercer's Company in 1392, the year after an alderman and sheriff. In 1397 he was chosen Mayor of London to fill the place of Adam Bamme who had died in his year of office, again in 1406, member of parliament for the city in 1416, and in 1419 for the third time mayor. He was knighted by Henry V., and died in the spring of 1423, and by his will rebuilt Newgate and St Michael's Church, connecting also a college and an almshouse with it, while he also restored St Bartholomew's Hospital, gave a library to Grey Friars, and provided drinking fountains.

See the Rev. Sam. Lysons' *Model Merchant of the Middle Ages* (1860), and Besant and Rice's *Sir Richard Whittington* (1881). Mr Lysons defends the famous traditional story of the beginning of Dick Whittington's good-fortune being the lucky sale of the cat he had committed to a friendly sailor to a Moorish king sorely distressed with rats and mice. He refuses to hear of the explanation that he traded with *cats* (three-masted vessels of about 500 tons) and sea-coal. But even if the modern story and the representation of the cat goes back to the 16th century, its historical character is still not proved. And unfortunately the main elements of the story are familiar in German, Italian, Russian, and Danish folklore. But none need doubt the other part of his romantic history, of how when a poor boy aweary of London he had made up his mind to fly, but was arrested on Highgate Hill by a merry peal from Bow Bells which rang to his ears 'Turn again, Whittington, Lord Mayor of London.'

Whittlesey, a market-town of Cambridgeshire, 5½ miles E. by S. of Peterborough. *Whittlesey Mere*, a shallow lake (2 by 1 mile), which formerly existed in the north of Huntingdonshire, 4 miles SW. of Whittlesey, abounded in fish, water-fowl, &c., but is now drained and laid out in cultivation. Pop. (1851) 4972; (1891) 3556.

Whitworth, a town of Lancashire, 3 miles N. by W. of Rochdale, with cotton manufactures and collieries. Pop. 9766.

Whitworth, SIR JOSEPH (1803–87). See CANNON, Vol. II. p. 714.

Whooper. See SWAN.

Whooping-cough. See HOOPING-COUGH.

Whortleberry (*Vaccinium*), a genus of small shrubs, of the natural order Vacciniaceæ, having a four- to five-toothed calyx, a four- to five-cleft bell-shaped or urceolate corolla, with the limb bent back, eight or ten stamens, with two-horned anthers, and a four- to five-celled many-seeded berry. The species are numerous, mostly natives of the northern parts of the world, with evergreen or deciduous, more or less ovate leaves. The Common Whortleberry, or Bilberry (*V. myrtillus*), called in Scotland the *Blaeberry*, is very common in Britain, and in the middle and north of Europe. It is found also in Iceland and in the northern regions of North America. It varies from a few inches to almost 2 feet in height, and has ovate deciduous leaves, and dark purple berries, covered with a mealy bloom. A variety occurs, but rarely, with white berries. The berries are very sweet and agreeable, and are much used for making jelly and tarts; they are also eaten in Devonshire raw with clotted cream. The juice of the berries mixed with the powdered bark of alder and alum is employed by the women of northern Russia to dye their hair bright red. A kind of spirituous liquor is also made from them in Germany. The Bog Whortleberry, or Great Bilberry (*V. uliginosum*), is common in the northern parts of Britain, and in the north of Europe and Asia. It is said to cover extensive tracts in Greenland. It grows in marshy situations, and is a taller plant than the common whortleberry. It has deciduous, obovate, entire leaves, and a fruit larger than the common whortleberry, and inferior to it in flavour. The fruit is said to cause giddiness when eaten in large quantity, and an intoxicating liquor is made from it. The Red Whortleberry (*V. vitis-idæa*) is found on the dry barren moors of Scotland (where it is called Cranberry, q.v.), in northern Europe, and America. The berries, dark red in colour, are acid, somewhat austere, and not so agreeable as the bilberry; yet they make an excellent jelly, which is esteemed for sore throats, and is much used by the Swedes as an accompaniment to venison and other roast meats. Many species of Vaccinium are in occasional cultivation as ornamental shrubs, and the fruit of most of them is agreeable, although in general it wants acidity. Huckleberry, a name of the Gaylussacia shrubs of North America, is sometimes given to the whortleberry, as is also Cowberry.

Whortleberry (*Vaccinium myrtillus*).

Whydah, or WHIDAH. See DAHOMEY.

Whydah Bird, or WIDOW BIRD (*Vidua*), a genus of African birds related to the Weavers, having long wings, and a boat-shaped tail, the two middle feathers of the tail of the males excessively lengthened during the breeding season. The name is derived from the country of Whydah in Dahomey, and 'Widow Bird' is a mere corruption of it, which, however, has given to the genus its name Vidua (Lat., 'widow'), regarded as appropriate

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because the long tail of the male drops off after the breeding season, and also because of the general dark colour of the plumage. They are frequently brought to Britain as cage-birds, both on account of their plumage and the sweetness of their song. The best-known species (*V. paradisea*) is a small bird, about the size of a canary, with black and brownish-black plumage, with a broad collar of orange-rufous colour, and breast of somewhat similar colour.

Whymper, EDWARD, wood-engraver and traveller, was born in London, 27th April 1840, the son of an engraver and artist. Trained an artist on wood, he became even more famous for his mountaineering than for his book-illustrations. In 1860–69 he scaled several hitherto unscaled peaks of the Alps, including the Matterhorn (q.v.). In 1867 he made valuable geological discoveries in Northern Greenland, and again in 1872. His memorable travels in the high Andes (including the ascent of Chimborazo and other peaks) took place in 1879–80. See his *Scrambles amongst the Alps* (1871), and his *Travels amongst the Great Andes of the Equator* (with valuable entomological and other scientific appendices, 2 vols. 1892).

Whyte-Melville, GEORGE JOHN, sporting novelist, was born in 1821 at Mount-Melville, near St Andrews, the son of a Fifeshire laird. He was educated at Eton; in 1839 entered the Coldstream Guards; retired in 1849 with the rank of major; but during the Crimean war joined the cavalry of the Turkish contingent (1855–56). From 1850 onwards he published upwards of a score of novels, four or five of them historical, but the best devoted to fox-hunting, steeplechasing, and country-house life generally. He met his death in the hunting-field, in the Vale of Aylesbury, 5th December 1878.

Wiborg. See VIBORG.

Wichern. See RAUHES HAUS.

Wichita, a city of southern Kansas, capital of Sedgwick county, on the left bank of the Arkansas River, 505 miles by rail W. by S. of St Louis and 228 SW. of Kansas City. It is the meeting-point of four great railway systems, and contains a number of flour and other mills, &c. Wichita was founded in 1870. Pop. (1880) 4911; (1890) 23,853.

Wick, the county town of Caithness, on the Wick River, at its entrance to Wick Bay, 161 miles by rail (1874) NNE. of Inverness. The royal burgh, with its suburbs Louisburgh and Boathaven, lies north of the river, and Pultneytown, a settlement (1808) of the British Fisheries Society, on the south bank. The tidal harbour is a good erection, with accommodation for vessels of light draught and a large fleet of fishing-boats; but a costly attempt to provide larger space with an increased depth of water, by building a new pier and other works farther out in the bay, has been but partially successful. Wick is one of the great centres of the herring-fishery, and to this industry everything is subordinated. Cloth and furniture are also made in some quantity, and there is an extensive distillery and brewery in Pultneytown. Coal and salt are the chief imports, and salt-herrings, oats, and live-stock are exported. The shipping trade is considerable, and steamers call from Orkney, Thurso, Aberdeen, and Leith. There is some fine rock-scenery in the neighbourhood. Pop. (1841) 5522; (1891) 8463.

Wick. See LAMPS, CANDLE.

Wicklow, a maritime county of the Irish province of Leinster, borders on Dublin, Carlow, Kildare, and Wexford. Its greatest length is 40 miles, and greatest breadth 33; the total area being 781 sq. m., or 500,178 acres, of which 118,000 are under tillage. The coast-line, in many parts precipitous, is obstructed by sandbanks, and very dangerous for shipping. The surface ascends in some parts most abruptly from the sea, and a large portion is mountainous and unproductive. The Wicklow Mountains form rather a group than a range; the highest point is Lugnaquilla (3039 feet), and the glens which lie between the several mountains or groups are exceedingly picturesque, especially Glendalough, Glendalure, Imail, the Glen of the Downs, and Avoca. The valleys are for the most part of limited extent; but some plains of considerable size lie upon the eastern and southern shores. The lakes, although strikingly beautiful, are few in number and of small size; and the rivers are little more than mountain-streams, except the Liffey and the Slaney, which rise in Wicklow. The great central group of mountains is a mass of granite, which protrudes through mica and clay slate. Lead, copper, sulphur, and iron are raised, with some silver; and gold in small quantities has been found. Slates, limestone, and marl are likewise wrought. In the mountains the soil is thin and poor, but generally dry, although there is a considerable proportion of bog. In the valleys and level districts the subsoil is generally gravel, and the soil is for the most part either dry or, even in the boggy districts, susceptible of drainage. Throughout the greater part of the county the occupations of the people are purely agricultural. The fisheries are almost wholly neglected; and the manufacture of flannels, once extensive, is now nearly extinct. The county is divided into eight baronies. The principal towns are Wicklow, the capital, part of Bray, and Arklow. The county returns two members to parliament. Pop. (1841) 126,162; (1861) 86,479; (1881) 70,386; (1891) 61,934, of whom 49,238 were Roman Catholics. At the invasion the greater part of Wicklow was granted to Maurice Fitzgerald, and Wicklow was included in the shire of Dublin. Generally speaking, however, the authority of the English in Wicklow was little more than nominal, the territory being under the command of the chief of the O'Byrne. A vigorous effort was made by the Lord-deputy, Sir Arthur Chichester, to establish the king's authority in Wicklow, and in 1605 it was erected into a separate county; but again in 1641 the population joined in the general uprising. During the rebellion of 1798 Wicklow was the scene of more than one conflict. Wicklow abounds with antiquities of the highest interest. Many tumuli, raths, cromlechs, and other Celtic remains are preserved; and there are very many ecclesiastical remains of almost every period of Irish Christian architecture; those of Glendalough, which include a round tower, are especially interesting.—The county town, Wicklow, stands at the mouth of the Vartry, 28 miles ESE. of Dublin by rail. As a seaport it has but small trade, and, though it attracts many visitors for sea-bathing, is rather a featureless place. Pop. 3390.

Wicliffe. See WYCLIF.

Widdin, a town in the north-west of Bulgaria, on the right bank of the Danube, 20 miles from the Servian frontier. For centuries the 'Virgin Fortress' was a strong Turkish post; but the Berlin Congress of 1878 decreed that the extensive fortifications should be demolished. Widdin has thriving industries and trade. Pop. (1887) 14,772.

Widgeon (*Mareca*), a genus of Ducks having the bill shorter than the head, the legs short, the feet rather small, the wings long and pointed, and the tail wedge-shaped. The species are numerous and very widely distributed. The Common Widgeon (*M. penelope*) breeds in the northern

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counties of Scotland, and is very abundant during winter in many parts of the British Islands. It feeds chiefly on grass and vegetable matter. The note is a shrill whistle, which has gained for

Widgeon, Male and Female (*Mareca penelope*).

the species its common names of Whew-duck and Whewer. The American Widgeon (*M. americana*), a slightly larger species than the foregoing, is abundant throughout the colder parts of North America. Its flesh, like that of the common widgeon, is highly esteemed for food.

Widnes, a borough of Lancashire, on the Mersey, 13 miles SE. of Liverpool by rail, with iron-foundries, copper-smelting works, and manufactures of soda, soap, candles, manures, &c. Its docks were enlarged in 1884. The population, about 2000 in 1851, had by 1891 increased to 30,011. Widnes, incorporated a borough in 1892, is connected with Runcorn on the other side of the Mersey by a handsome railway bridge.

Widow, by English law, has rights of some importance in her husband's property. She is entitled to dower—i.e. to a life estate in one-third of his lands; the Dower Act of 1833 extends this right to equitable estates, but by the same act great facilities were given for barring the widow's claim, and dower estates are now seldom met with in practice. A widow is also entitled to a share in her husband's personal property not disposed of by will; her share is one-third if there be any child or other descendant of the husband, one-half if there be none. A woman loses her dower by divorce, but not by judicial separation; if she leaves her husband to live with an adulterer, she loses her dower unless the husband takes her back willingly. For the rights of a widow in Scotland, see articles DEAD'S PART, HUSBAND AND WIFE, JOINTURE. In the United States a widow usually takes one-third of her husband's personalty not disposed of, and one-third or more of his real estate, but the laws of the different states vary widely on this point; see Stimson's *American Statute Law*.

Widow Bird. See WHYDAH BIRD.

Wieland, CHRISTOPH MARTIN, a writer who, more in virtue of his tendency and his style than of his actual literary achievements, occupies a prominent place in the history of German literature. The son of a Swabian pastor, and born near Biberach on 5th September 1733, he was brought up in the tenets of pietism and (like young Schiller) conceived an extravagant admiration for Klopstock. These influences, co-operating with a boyish affection, pressed the precocious youth into composing poetry of a deeply religious strain. Bodmer (q.v.), recognising his talent, invited him (1752) to Zurich and inspired him to write *Der geprüfte Abraham* and similar books full of exaggerated sentimentality and religious mysticism. But the native bent of Wieland's disposition was towards the exactly opposite direction, and began to show itself even before he left (1760) Switzerland to take up an official position in his native town. During the next nine years he was chiefly influenced by French writers such as Voltaire and Rousseau and by the society of Count Stadion, a thorough man of the world, and of the beloved of his youth, Sophie von Laroche, now, however, married; in this period, besides making the first German translation of Shakespeare's plays (8 vols. 1762–66), he wrote the romances *Agathon* and *Don Silvio von Rosalva*, *Die Grazien* and other tales, the didactic poem *Musarion*, &c., books in which he advocates taking a full enjoyment of the good things of this life, sometimes in a sense that oversteps the bounds of decent license. The easy and elegant style, the grace and lightness of treatment, and doubtless the strong flavour of the current of French materialism that mark these productions made Wieland the most popular author of his day with fashionable society, who hitherto had read nothing but French literature. After holding for three years a professorship at Erfurt, Wieland was called to Weimar to train the sons of the grand-duchess, and there he spent most of the rest of his life, living on a good pension from the grand-duke and enjoying in his later years the friendship of Goethe and the acquaintance of Herder. He lived to a green old age and died, still hale and cheery of spirit, on 20th January 1813. The chief fruits of his literary activity during this Weimar period were the heroic poem *Oberon*, his best and most popular work, and that by which he is best remembered; the historical romances *Die Abderiten*, *Aristipp*, &c., the elegant satire of which is perhaps their principal charm; the graceful narratives in verse entitled *Auserlesene Gedichte* (1784–87); German versions of Lucian, Horace, and Cicero's *Letters;* and the editing of the magazines *Die Teutsche Merkur* (1773–89), *Attisches Museum* (1796–1801), and *Neues Attische Museum* (1802–10), all of which enjoyed considerable vogue in their day.

Wieland's *Werke* were published in 53 vols. in 1818–28, and in 40 vols. in 1879; editions of *Auspewählte Werke* in 6 vols. in 1887 and in 6 vols. in 1889. See Lives by Gruber (4 vols. 1827–28) and Seuffert (in preparation), and collections of Wieland's Correspondence (1815–16, 1818, 1820).

Wieliczka, a small town of Austrian Galicia, 10 miles SE. of Cracow by rail, remarkable for its salt-mines, in which over 1000 of its 6289 inhabitants are employed. For the mines, see SALT. The annual output exceeds 50,000 tons.

Wieniawski, the name of two brothers born at Lublin in Poland, distinguished both as players and as composers. The elder, HENRI, violinist (1835–80), studied at Paris, was for twelve years solo-violinist to the czar, and for a time taught at the Conservatoire in Brussels, besides giving concerts in many lands, including America. He left many compositions for the violin.—JOSEPH, pianist (b. 1837), studied at Paris and Berlin, taught in the Conservatorium at Moscow, held a conductor's post at Warsaw from 1871 till 1877, when he resumed solo playing. Of his compositions for the piano some forty are favourably known to concert-goers.

Wier, JOHANN, one of the first opponents of the witchcraft superstition, was born in 1516 at Grave in North Brabant, studied medicine at Paris and Orleans, and settled about 1545 as a physician at Arnheim, whence he was called to Dusseldorf to be body-physician to Wilhelm IV., Duke of Jülich, Cleves, and Berg. To him he dedicated his famous treatise, *De præstigiis dæmonum et incanta-*

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tionibus ac veneficiis (Basel, 1563), a plea addressed to the duke and all princes against the folly and cruelty of the witchcraft trials. The book pleased Duke Wilhelm, but roused the fury of the clergy. It still stands in the *Index*, but it has given its author a name to be remembered among the benefactors of humanity. The duke protected him till his death on a journey in Secklenburg, 24th February 1588. Wier was a Protestant, and had been a pupil of Cornelius Agrippa, and so his respect for authority was naturally weakened; but it cannot be said that his scepticism is audacious. Still, as Mr Lowell says, he insinuates much more than he positively affirms or denies, and most probably he went as far as he dared, feeling that to go further would damage his case. His famous treatise was followed by *De Lamiis*, and by the *Pseudomonarchia Dæmonum*, a description of the hierarchy of Hell, 'with the names and surnames,' says his indignant antagonist Bodin, 'of seventy-two princes, and of seven million four hundred and five thousand nine hundred and twenty-six devils, errors excepted.' Bodin no doubt felt that the real object was to make the whole thing ridiculous, hence his anger at a writer who 'had armed himself against God' and concocted a tissue of 'horrible blasphemies.' See study by R. Binz (Bonn, 1885).

Wiertz, ANTON JOSEPH, painter, was born at Dinant, 22d February 1806, and studied at Antwerp and Rome. In 1836 he settled in Liége, and in 1848 at Brussels, where he died 18th June 1865. His original artistic ideal was to combine the excellences of Michelangelo and Rubens; and his efforts in this direction are visible in his pictures of 'The Fight of Greeks and Trojans round the Dead Body of Patroclus,' 'The Disobedient Angels,' 'The Death of St Denis,' 'Eve and Satan,' 'The Flight into Egypt,' and 'The Triumph of Christ'—some of them very large canvases. As he could not persuade himself to sell such pictures, he maintained himself now and later by painting portraits. About 1848–50 he developed a new technical method which he called *Peinture Mate;* and now he began to paint totally different subjects—speculative and mystical pieces, dreams and visions, and the horrible outcome of a morbid imagination—premature burial, suicide, madness, execution, sensations after death. There were genre pictures also which were only eccentric—'Quasimodo,' 'The Young Witch;' and even pleasing and kindly pictures—'The Maid at her Toilet,' 'The Confession;' and he also left some sculptures. In 1850 the state had built for him a large studio in Brussels, and at his death this became, by an arrangement between the state and his heirs, the Musée Wiertz, one of the sights of the city. There are monographs by Labarre (1866) and Claessens (1883).

Wiesbaden, chief town of a Prussian district in the province of Hesse-Nassau, was formerly capital of the independent duchy of Nassau. One of the oldest and most famous of the German watering-places, it is delightfully situated on the south slopes of Mount Taunus, and 5 miles NW. of Mainz by rail. The town has been called 'a city of lodging-houses,' and this may be understood from the fact that during the 'season' the number of the visitors is almost as large as that of the resident inhabitants. The principal buildings are the palace (1840); the Kursaal (1810), where the visitors convene, in its delightful park and gardens; the new town-hall (1888); the museum, picture-galleries, and library; the handsome Protestant church (1853–62); the superb Greek chapel (1855), built by the Duke of Nassau as a mausoleum for his duchess; the Catholic church; the synagogue, &c. There are some twenty hot-springs; but the principal is the *Kochbrunnen* ('Boiling-spring'), the temperature of which is 156° F. The spring has all the appearance of a boiling caldron, and so copiously does it pour forth its waters that, though they are used both for drinking and to supply the principal baths in the town, a vast quantity escapes, and runs away through gutters and drains, sending up clouds of vapour in its passage along the streets, and adding to the warmth of the temperature of Wiesbaden in summer. Next in heat and volume to the *Kochbrunnen* is the spring that rises in the garden of the *Adler* ('Eagle') Hotel, the temperature of which is 134° F. The use of the Wiesbaden hot-springs is considered highly efficacious in cases of gout, rheumatism, scrofula, and other skin diseases and nervous affections. The waters of these springs are saline, and contain silica and iron. The prosperity of Wiesbaden is entirely due to its springs; and the beauty of its situation and environment, the agreeable walks and rides, and the never-failing gaiety that prevails during the season render it one of the most popular of the spas. Though the public gaming-tables were abolished in 1872, the number of visitors annually is about 60,000; some 5000 or 6000 strangers winter here annually. Pop. (1871) 35,463; (1890) 64,692. Wiesbaden is very ancient; its springs were known to the Romans, who built a station here and erected a fort. Many Roman remains have been dug up here and in the neighbourhood.

See works by Otto (1877), Roth (1883), Mordhorst (1886), and Heyl (5th ed. 1889).

Wiesen, an alpine health-resort for the weak-chested, is 4771 feet above the sea-level, and 12½ miles SW. of Davos by the diligence route to Chur (Coire).

Wife. See HUSBAND AND WIFE, MARRIAGE, WEDDING, WIDOW.

Wiffen, BENJAMIN BARRON (1794–1867), was born at Woburn, Bedfordshire, of Quaker parentage, and devoted himself to the editing and reprinting of the writings of early Spanish Reformers, his works (1848–69) numbering twenty-nine, and his valuable collections being now in the library of Wadham College, Oxford.—His brother, JEREMIAH HOLME WIFFEN (1792–1836), librarian to the Duke of Bedford at Woburn Abbey, translated Garcilaso de la Vega, Tasso, &c.

Wig, a contracted form of *periwig*, which is a modification (through the Dutch) of *peruke*, from Fr. *perruque;* other Romance forms are *peluca* and *piluca*, and all of them are from Lat. *pilus*, 'a hair.' Wigs were in use from the earliest times, not merely to cover baldness, but, like elaborate coiffures of the natural hair (see HAIR-DRESSING), to add to the dignity or formidableness of savages. Wigs are found on Egyptian mummies, and are indicated in Assyrian sculptures, and passed from Persians, Medes, Lydians, and Carians to Greeks and Romans. But the wig-making and wig-wearing as known to moderns originated in France, and the palmy days of wigs were in the 17th and early 18th centuries. Originally more or less an attempt to reproduce an exceptionally fine head of hair, wigs became in the *allongé perruque* huge masses of hair that, falling down on the shoulders, were parted into two groups or bunches of ringlets, one on each breast. Louis XIV. wore a wig till then of unparalleled size. The English full-dress wig of Queen Anne's time was similar; and this cumbrous type survives in the full-dress full-bottomed wig of English judges, which has flaps of twenty or more rows of stiff and formal curls hanging down in front. The smaller and more ordinary tie-wig (in which the lower part of the wig was tied) is fairly represented by the judge's undress wig and the barrister's or advocate's

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frizzed wig. Another form was the bag-wig—the lower part of the wig being tucked into a silken bag on the shoulders. The serjeant's Coif (q.v.) is extinct. When the wearing of wigs was fully established small boys of the well-to-do classes went to school in wigs and cocked-hats. In the early part of George III.'s reign it became more and more usual for private persons to do without wigs, wearing their own hair powdered and tied or looped up like a wig; professional men, especially doctors, stuck longer to them. Just before the French Revolution, which dealt the final death-blow to wig-wearing, a gentleman's wig would cost from 30 to 40 guineas. It should be noted that in France the Catholic Church had resolutely but in vain opposed itself to the introduction of the custom. Bishop Blomfield was the first bishop who set the example of wearing his own hair; Archbishop Sumner still wore a wig at the wedding of the Princess Royal of England in 1858. Professional wigs are now only worn by the Speaker of the House of Commons (a full-bottomed one), judges, and barristers; and a wig is part of the livery of some coachmen. Such wigs are made of white horse-hair, laboriously cleaned, curled, and woven on silk threads, and fitted. Wigs to supply natural deficiency of hair are of course made of human hair. Stage-wigs are often made of jute. A barrister's wig of frizzed hair costs five or six guineas. See FASHION, HAIR-DRESSING.

Wigan, a municipal, parliamentary, and county borough of Lancashire, on the Douglas (a feeder of the Ribble's estuary), 15½ miles S. by E. of Preston, 18½ NE. of Liverpool, and 18 WNW. of Manchester. Situated in the heart of a rich coalfield, and commanding easy communication by both rail and water, it is an ancient place, on the site, it is thought, of a Roman station, but owes its present development to the growth of the cotton industry. The manufactures include calicoes, ginghams, tablecloths, fustians, linen, iron, paper, &c., some of its cotton-mills and ironworks being among the largest in England. All Saints' parish church, a stately edifice dating from the 14th century, was in great measure rebuilt in 1856; and there are also the county buildings (1888), public hall (1853), market-hall (1877), free public library (1878), infirmary (opened by the Prince of Wales, June 4, 1873; enlarged 1884), baths (1882), grammar-school (1619; rebuilt 1876), and a public park (1878) of 27 acres, laid out at a cost of £20,000. A prescriptive borough, whose privileges were confirmed by Henry III., Edward II. and III., Richard II., and Charles II., Wigan returned two members to parliament from Edward VI.'s reign till 1885, when their number was reduced to one. It became a county borough in 1888. Pop. (1831) 20,774; (1881) 48,194; (1891) 55,013. In 1642 Wigan was occupied for the king by the Earl of Derby, but it was twice taken by the parliamentarians; and in 1651 the earl was defeated here by Lilburne. Prince Charles Edward on his southward march passed through the town. Its most eminent native is the apologist Leland. See W. Sinclair's *History of Wigan* (2 vols. 1882).

Wight, THE ISLE OF, with the exception of the Isle of Man the largest island in the English seas, lies off the southern coast of the kingdom, separated from Hampshire by the Solent, a channel mainly ranging between 2 and 4 miles in breadth, but only a mile in width on the west, between Hurst Castle and Cliff End, while it expands to 7 miles between Southsea and the Foreland on the east. In shape Wight is an elongated rhomboid, and the outline has been fancifully likened to that of a turbot. Its extreme length, east to west from the Foreland to the Needles, is about 23 miles, and its extreme breadth, north to south, Cowes to St Catharine's Point, is about 13 miles. The area is calculated at 145 sq. m., or 92,931 acres, but was formerly estimated at much more. A bold range of chalk downs runs somewhat irregularly east and west the entire length of the island, terminating on the west in the fine isolated peaks of the Needles—so well known in the navigation of the Channel, and especially in connection with the port of Southampton—and breaking off on the east at Culver and Bembridge. These downs at several points reach from 500 to 700 feet; but they are excelled in altitude by the high land on the extreme south or 'back' of the island, where St Boniface Down above Ventnor attains 787 feet. This is the highest point of the isle, though St Catharine's Beacon to the westward is only half-a-dozen-feet less. The more elevated ground being thus on the south, the chief streams flow to the north, and three of them traverse nearly the whole breadth. Thus the eastern Yar rises on St Catharine's Hill, and falls into a landlocked lake-like estuary at Brading, partially cutting off a peninsular region on the east, known as the Isle of Bembridge. The chief river of the island, the Medina, also rises at St Catharine's, and runs directly northward to the Solent at Cowes. In its course it divides Wight into two fairly equal parts—east and west Medina. Towards the western extremity is another Yar, which rises within a short distance of the southern coast cliffs, and has its embouchure at Yarmouth. This peninsulates a bold district known as the Isle of Freshwater. Smaller streams flow northward to a many-branched tidal inlet at Newtown; and another finds its way through the Wootton Creek between Cowes and Ryde. The streams which flow southward are unimportant so far as size is concerned, and their courses are short, but they play an important part in specialising the characteristics of the island by the formation of 'chines,' narrow ravines worn through the soft rocks by which they pass into the sea—Blackgang the most weird, and Shanklin the most romantic. The geology teems with interest, ranging from the Wealden to the Eocene, and fossiliferous localities of the greatest importance are numerous. The strata form an ascending series generally from south to north. The Wealden beds appear on the south-west coast, chiefly between Atherfield and Compton Bay, where the Wealdens join the Upper and Lower Greensand, Gault, and Chalk, as also at Redcliff Bay near Sandown. The Lower Greensand and Gault extend generally from Atherfield to St Catharine's Point, and from Bonchurch to Sandown. Northward lies the Chalk, chiefly to be noted at Freshwater and Culver. In the remaining portion of the area Oligocene and Eocene beds are finely and characteristically developed. Headon Hill and Alum Bay (long noted likewise for its variegated cliff sands) are the best localities for studying these strata generally, while there are also noteworthy fossiliferous fresh-water deposits, as at Binstead. The flora of the island is rich, especially in chalk and seaside plants; and marine algæ are plentiful.

Wight has long been in repute for the mildness of its climate and the productiveness of its soil; and the former of these features, in conjunction with the picturesque variety and exceeding charm of its landscapes, and the ever-changeful attractions of its romantic coast-line have made it one of the best known of modern seaside centres. It claims some special attention for each of its favourite resorts. Ventnor, best known of all, is delightfully seated in the heart of the singularly beautiful scenery of the rugged Undercliff, a picturesquely broken belt of shifted land between

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cliff and sea. Sandown boasts a long stretch of beach, and Freshwater is the centre of the finest rock scenery. But of late years almost every village near the coast has laid itself out for the reception of visitors, and creeks and bays are dotted with hotels. Of ordinary trade there is comparatively little, though there is a fair amount of yacht-building at Cowes, which maintains its position as one of the chief yachting centres of the world. Railways traverse the island between Ryde and Ventnor, with a branch to Bembridge; and there are lines from both Ventnor and Ryde to Newport, and from Newport respectively to Yarmouth and Freshwater, and to Cowes. Ryde has a fine pier. Wight has come the more into favour of recent years from the fact that it was chosen by Queen Victoria as the seat of her marine residence at Osborne. The house, which faces the Solent, eastward of Cowes, was built in 1845. Farringford, near Freshwater, was the favourite residence of Lord Tennyson. Parkhurst Forest, once a royal hunting ground, and of some value as a source of timber for the navy, is now a pleasant tract of woodland, but of little utilitarian importance.

There are yet traces on the downs, in barrows and cairns, of the earlier inhabitants of the island, but its history really begins with its conquest by Vespasian as *Insula Vectis*. From this name of *Vectis* it has been suggested that it may have been the *Iktis* of Diodorus Siculus, to which the British tin was brought in carts at low tide, but apart from other difficulties there is no evidence that the Solent could ever have been fordable in the historic period. There is, however, ample evidence that the island was well appreciated by the Romans. In all probability they had their chief station at Carisbrooke, the central stronghold, and in that village still exist the remains of a small Roman villa. The foundations of a Roman building of much more importance were discovered in 1880 at Morton, near Brading, the pavements of which are remarkably fine. Cerdic is said to have reduced the island in 530; but it did not fall definitely under Saxon rule until later. After the Norman Conquest it was given to William Fitzosborne, but was forfeited by his son, and passed to the Redvers family, who thence took the title of 'lords of the isle.' Baldwin de Redvers, second Earl of Devon, founded there the Cistercian abbey of Quarr, of which a few traces still remain; and in the House of Redvers Wight remained until the death in 1292 of Isabella de Fortibus, *domina insulæ*, when it passed to the crown. Carisbrooke Castle, the most important relic of antiquity in the island, is mainly connected with these Redverses. Norman work may be traced, but the chief portions of the older masonry were executed by the Earls of Devon of this line, one of whom made the famous well, from which water is still raised as of old time by a donkey working in a wheel. The castle was strengthened at the time of the Armada, and it became the prison of Charles I. for some months shortly preceding his execution. In 1650 his younger children were sent hither, and here died the Princess Elizabeth, a monument to whom by Marochetti was placed by the Queen in Newport church. Carisbrooke was the official residence of the governor of the island, which has long been a titular office merely; and it has been for many years a ruin. There are, however, several government establishments, as at Parkhurst, and sundry forts connected with the defences of Portsmouth and Spithead. Before 1832 Wight returned six members to parliament, two for Newport, two for Yarmouth, and two for Newtown, the actual site of which had then no inhabitants. Yarmouth and Newtown were disfranchised, and a county member given to the Isle, which had previously ranked under Hampshire. Now it has no parliamentary borough, and one member for the island only; but it has become an administrative county under the County Councils Act, 1888. The population of the Isle of Wight has more than doubled in the past half century, and is steadily on the increase. In 1891 it was 78,718 as against 73,633 in 1881; and Ryde was the only town which showed a falling off, though it still remained the chief centre, having 10,952 inhabitants against 10,216 for Newport, the other municipal borough. Ryde was closely approached, however, by East and West Cowes, which lie on either side of the embouchure of the Medina, and may fairly be treated as one community, with a joint population of 10,648. Of the other towns Ventnor had a resident population of 5817, St Helens (district) of 4469, Sandown of 3592, and Shanklin of 3277. But these figures are largely increased in the tourist season.

See works by Sir R. Worsley (1781), Sir H. C. Englefield (1816), W. H. D. Adams (1856), Percy G. Stone (1891), and T. W. Shore (1892).

Wigton, a market-town of Cumberland, in the midst of a specially agricultural district, 11¼ miles by rail SW. of Carlisle. It carries on manufactures of ginghams and winceys. Pop. 3836.

Wigtown, a county forming the south-west corner of Scotland, the western half of Galloway, bounded on the W. by the Irish Channel, N. by Ayrshire, E. by the Stewartry of Kirkcudbright and the Solway Firth, and S. by the Irish Sea. Its length from east to west is 30 miles, its breadth from north to south 28 miles. Area, 327,906 acres; pop. (1851) 43,389; (1891) 36,048. Wigtownshire is deeply intersected by two arms of the sea, the narrow inlet Loch Ryan (q.v.) in its north-western corner, and Luce Bay on the south, 16 miles long, 18¾ wide at its mouth, as measured from the Mull of Galloway on the west—the southernmost extremity of Scotland—to Borough Head on the east. The western peninsula thus formed, known as the *Rhinns of Galloway*, is 28 miles long from Corsewall point in the north to the Mull of Galloway. The south-eastern portion of the county forms a blunt triangular peninsula—the *Machers*—ending in Borough Head, washed on the west by Luce Bay, on the east by Wigtown Bay, 15 miles long and 14 wide at its mouth, separating it from the Stewartry. The rest of the county north of the Machers and east of Loch Ryan bears the general name of the *Moors*, great part being occupied by bleak fells and high mosses. The surface is diversified, but the only hills that reach 1000 feet are on the northern borders—one solitary peak in the Rhinns, Cairn Piot, reaches a height of 593 feet. The chief streams are the Cree and Bladenoch, emptying into Wigtown Bay, the Luce (formed by the junction of the Cross and Main Waters of Luce) and Piltanton, into Luce Bay. The lakes are very numerous, but small—in one parish alone (Inch) there being no fewer than eleven. The climate is mild, but moist. There are neither minerals nor manufactures, the entire industry being agricultural, as much as 46 per cent. of the surface being arable. Excellent farming has made the most of but indifferent soil, and the dairy farms of the county deserve the reputation they have gained. The cows are frequently let for hire to *bowers* or practical dairymen, at from £9 to £12 per head, the farmer supplying all food and the dairyman the labour. Most of the cows are of the Ayrshire breed; the pure native breed of large black hornless cattle are seldom seen, still less the small Galloway pony formerly so popular. The principal towns and villages are Stranraer, Wigtown, Newton-Stewart, Whithorn, Glenluce, Newluce, Cairn Ryan, Portwilliam, Garlieston, Dromore, Portpatrick, and Lochans.

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See W. M'Ilwraith's *Guide to Wigtownshire* (Stranraer, 1876); also the article GALLOWAY, and books enumerated there. For descriptions of the *crannogs* and other lake-dwellings found in Wigtownshire, see Robert Monro in *Ayr and Wigtown Arch. Coll.* (vol. v.), and the Rev. George Wilson in *Proc. Soc. Antiq. Scot.* (vols. ix. and x.). The only ecclesiastical buildings of which ruins remain are the Cistercian abbey of Glenluce (1190) and the old cathedral of Whithorn.

WIGTOWN, the county town, a royal and municipal (and till 1885 parliamentary) burgh and seaport, is situated on the west side of Wigtown Bay, near the mouth of the Bladenoch Water, 7¼ miles S. of Newton-Stewart by rail and 129 SSW. of Edinburgh by road. The only noticeable buildings are the parish church (1853) and the Tudor town-hall (1862–63). In the churchyard are the graves of the famous 'Wigtown martyrs,' an old woman and a young girl who, refusing the Abjuration Oath, were tied to stakes at the mouth of Bladenoch and drowned by the incoming tide, 11th May 1685. An obelisk to their memory also stands on the Windy Hill. An attempt has been made to prove that this atrocious sentence was never executed, as a recommendation to pardon stands in the Privy-council registers, but the fact that the sentence was carried out before this remission was conveyed to Wigtown may be considered to be proved as satisfactorily as any question of its kind can be by the Rev. Dr A. Stewart's *History Vindicated* (2d ed. 1869), in answer to Mark Napier's *Case for the Crown* (1863). Wigtown has a little shipping, and at Bladenoch Bridge there is a distillery. Pop. (1881) 1725; (1891) 1445.

Wigwam. See TENT.

Wilberforce, SAMUEL, was born at Clapham, on September 7, 1805, the third son of William Wilberforce, the anti-slavery philanthropist. Of his father's letters to him after his twelfth year 600 are extant, many of them inculcating the duty and solemnity of private prayer. By his father too he was early taught to express himself clearly upon prescribed subjects. In the 'Union' debating society at Oxford, formed just before he entered Oriel College, aged eighteen, he cultivated this habit, so that in after life eloquence was one of his most marked personal gifts. In 1826 he graduated with first-class honours in mathematics and second-class in classics. On June 11, 1828, he married Miss Emily Sargent, whose younger sister married H. E. (afterwards Cardinal) Manning, and through whom he inherited Lavington in Sussex. On December 21 he was ordained curate in sole charge of Checkendon church, near Henley, and in 1830 became rector of Brightstone, Isle of Wight (Bishop Ken's parish 1667–70). His zeal and his thorough sympathetic mastery of his parochial work there soon made him one of the foremost clergymen in the island, of the north-east of which he became rural dean in 1836, and prepared him for the efficient discharge of the important offices to which he was in rapid succession called. A successful tour in Devon and Cornwall in 1839 on behalf of the S.P.G. brought him into further notice, and the same year he became archdeacon of Surrey. In 1840 he was appointed rector of Alverstoke and canon of Winchester, and an anti-slavery speech so impressed the Prince Consort, who was present, that the following year he was made one of the prince's chaplains and preached at court. Before that, however, the great sorrow of his life had befallen him in the death of his wife. In March 1845 he was appointed Dean of Westminster, and in October, on the eve of Newman's reception into the Church of Rome, Bishop of Oxford. Beginning his episcopate at such a crisis, immersed shortly thereafter in the sea of difficulties raised by the promotion of Dr Hampden to the bishopric of Hereford, distressed by the Gorham judgment, involved in the troubles connected with *Essays and Reviews* and Bishop Colenso, in all which controversies he took an active and prominent part; deeply wounded too by the secession to Rome of his three brothers, his only daughter, and his son-in-law, and by the early death of his eldest son, he nevertheless so governed the diocese for twenty-four years as to deservedly earn the title of the 'Remodeller of the Episcopate.' He has been regarded as the representative member of the bench of bishops, almost of the English Church, during the third quarter of the century, and with him the new order of bishops may be said to begin. Watchfulness and work, not pomp and ease, were his characteristics. His confirmations were made opportunities of lasting impressions, his ordinations seasons of true devotional preparation. He instituted Cuddesdon training-college, and he was mainly instrumental in reviving Convocation as a synodical assembly after it had for nearly 150 years been a mere form. He claimed to belong to the school of the old Church of England, opposed alike to 'Puritan sourness and Romanising superstition.' The charm of his many-sided personality, his administrative capacity, his extraordinary power of work, his social gifts as a ready humorist and a brilliant conversationalist, and his gifts as an orator on the platform and in the pulpit, and as a debater in parliament, are universally acknowledged, but the man has been too much lost sight of in the versatile ecclesiastic, the devout Christian in the popular bishop. 'Too clever, too self-reliant . . . too persuasive, too fascinating in manner, too fertile in expedients . . . too facile,' he got the sobriquet of 'Soapy Sam,' but there was truth as well as wit in his own explanation of the name, that it was because 'he was always in hot water, and always came out of it with clean hands.' The tenderness of his family affection, his life-long devotion to the memory of his wife, and the depth and humility of his inner life are touchingly brought out in his too brief diary. He was neither a great theologian nor a voluminous author, but he edited *Letters and Journals of Henry Martyn* (1837), wrote along with his brother the Life of his father (1838), and himself wrote *Agathos* (1839), *Rocky Island* (1840), *History of American Church* (1844), and contributed to the *Quarterly Review*. In 1869 he was transferred to Winchester, and on 19th July 1873 was suddenly killed by falling from his horse while riding with Earl Granville, near Dorking. He is buried beside his wife in the churchyard at Lavington, of which his eldest son Reginald Garton is now proprietor, his son Ernest Roland being bishop of Newcastle, and Albert Basil Orme canon of Winchester.

See *Life* (3 vols. 1879–82; vol. i. by Canon Ashwell, ii. and iii. by his son, R. G. Wilberforce); *Bishop Wilberforce* (1 vol. 1888), by that same son; *Bishop Wilberforce*, by Daniell in the 'English Leaders of Religion' series (1891); and the sketch by Dean Burgon in his *Lives of Twelve Good Men* (1888).

Wilberforce, WILLIAM, abolitionist and philanthropist, was born at Hull on 24th August 1759. His father was a wealthy merchant, descended from an old family, proprietors of Wilberfoss, in the East Riding of York. After a delicate childhood, Wilberforce, at the age of nine, on his father's death, was sent to school at Wimbledon, where, under the care of a pious aunt, he was like to become a Methodist. But his mother did not approve of a serious education, and removed him to a school at Pocklington, Yorkshire, where the religious impressions he had received were soon dissipated by a life of gaiety. His constitution was delicate, but he was quick and spirited, and

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fond of society, in which his lively conversation and musical talent made him a great favourite. While at school he addressed a letter to a York paper (1773) 'in condemnation of the odious traffic in human flesh,' the removal of which was afterwards the main object of his life. At seventeen he entered St John's College, Cambridge, and in due time he passed his examinations with credit. He came, on attaining his majority, into possession of a large fortune, and determined to enter parliament. In 1780 he was returned for Hull. He had known Pitt when at Cambridge, made a tour in France with him in 1783, and in London they became inseparable friends. But Wilberforce, in parliament, remained independent of party. The elevation of Pitt to the premiership gave him an opportunity of taking office, but he declined to do so. He rendered, however, efficient service to his friend. In 1784 he was returned to parliament for both Hull and Yorkshire, and took his seat for the county. In 1784–85 Wilberforce made a tour on the Continent with some ladies of his family and Isaac Milner, the Dean of Carlisle, in conversation with whom he became seriously impressed with the truths of the Christian religion, and the rest of his life was leavened with a spirit of earnest piety and devotion. In 1787 he in a great measure eschewed gaiety, and founded an association for the reformation of manners; and in 1788, while in very bad health, he entered on his nineteen years' struggle for the abolition of the slave-trade, to which he thenceforward dedicated his whole time. He was powerfully supported by the Quakers, and by Mr Thomas Clarkson, who kept alive interest in the subject outside the walls of the House of Commons. Pitt, in the absence of Wilberforce through ill-health, introduced the subject to parliament in 1788; in the following year when Wilberforce proposed the abolition of the slave-trade in the House of Commons, he met with powerful opposition, until, after several years of indefatigable labour, the measure for abolition received the royal assent 25th March 1807. Sir Samuel Romilly, who supported the measure, compared the feelings of Napoleon, then at the height of his glory, with those of the English philanthropist, 'who would that day lay his head upon his pillow, and remember that the slave-trade was no more;' and the whole House burst into applause, and greeted Wilberforce with enthusiastic cheers. Wilberforce now sought to secure the abolition of the slave-trade abroad. He at the same time entered on an agitation for the total abolition of slavery itself. Declining health, however, compelled him in 1825 to retire from parliament, in which, since 1812, he had sat for the borough of Bramber. The movement against slavery was then entrusted to Sir T. Fowell Buxton. Three days before Wilberforce's death news was brought him that the Abolition Bill had passed a second reading, and he thanked God he had lived to see his countrymen spend 20 millions sterling in such a cause. He died 29th July 1833, and was buried in Westminster Abbey, where there is a statue of him. Yorkshire erected a county asylum to his memory, and Hull a column. In 1797 Wilberforce married the daughter of Mr J. Spooner, the banker of Birmingham, by whom he had a family of six children. Wilberforce is the author of a *Practical View of Christianity*, which, on its publication in 1797, went through five editions in half a year, and was translated into four European languages. He interested himself in the founding of the *Christian Observer* (1801) and in many schemes for the welfare of the community. He also assisted Hannah More in the founding of her schools at Cheddar. One-fourth of his income went for private charity. He possessed great conversational powers, and was cheerful in disposition, witty and vivacious, a lover of music and flowers. Sir James Mackintosh said, 'I never saw one who touched life at so many points.' He further described him as the most amusable man he had ever met in his life; instead of having to think what subject would interest him, it was perfectly impossible to hit on one which did not. See *Life* by his sons (5 vols. 1838).

Wilbrord. See WILLIBROD.

Wild, JONATHAN, was born about 1682 at Wolverhampton, and served a seven years' apprenticeship to a buckle-maker in Birmingham. He married, but about 1706 deserted his wife, and came up to London, where, during a four years' imprisonment for debt, he consorted with criminals. Thereafter he turned a receiver of stolen goods and a betrayer of such thieves as would not share with him, until for theft and receiving he was hanged at Tyburn on 24th May 1725. He forms the theme of Fielding's powerful satire, *The History of the Life of the late Mr Jonathan Wild the Great* (1743).

Wildbad, a small town of Würtemberg, in the Black Forest, on the Enz, 33 miles SSE. of Carlsruhe by rail. Its thermal baths, ranging from 90° to 98° F. in temperature, consist of numerous basins formed round the springs as they gush from the rocks. The waters are nearly pure, their chief ingredient being common salt; and they are peculiarly beneficial for rheumatism, gout, stiffness of limbs, paralysis, &c., and for some skin diseases. The season lasts from May till September, and the number of visitors has steadily increased from 470 in 1830 to over 7000 annually. Pop. 3514.

Wild Boar. See BOAR.

Wilderness, a region in Virginia, 2 miles S. of the Rapidan, covered with dense thicket, and memorable for the dreadful two days' battle fought in its depths by Grant and Lee, May 5–6, 1864. The Union loss was 18,000, the Confederate 11,000, and the desperate fighting utterly without advantage to either side. The name Wilderness Campaign has been given to all the movements of Grant's overland march to Richmond, and including the battles of Spottsylvania Courthouse (q.v.) and Cold Harbor. See GRANT.

Wild-fowl. The Act of 1880 for the protection of wild-fowl in Britain specifies the following (a number of the names being merly local terms) as 'wild birds' which may not be shot or killed save between 1st August and the last day of February: American quail, auk, avocet, bee-eater, bittern, bonxie, colin, Cornish chough, coulterneb, cuckoo, curlew, diver, dotterel, dunbird, dunlin, eider duck, fern owl, fulmar, gannet, goatsucker, godwit, goldfinch, grebe, greenshank, guillemot, gull (except black-backed gull), hoopoe, kingfisher, kittiwake, lapwing, lark, loon, mallard, marrot, merganser, murre, night-hawk, night-jar, nightingale, oriole, owl, oxbird, oyster-catcher, peewit, petrel, phalarope, plover, ploverspage, pochard, puffin, purre, razor-bill, redshank, reeve or ruff, roller, sanderling, sandpiper, scout, sea-lark, sea-mew, sea-parrot, sea-swallow, shearwater, sheldrake, shoveller, skua, smew, snipe, solan-goose, spoonbill, stint, stone curlew, stonehatch, summer snipe, tarrock, teal, tern, thick-knee, tystey, whaup, whimbrel, widgeon, wild duck, willock, woodcock, and woodpecker. The term wild-fowl is often limited to waterfowl, which are got at by various special methods, including the gunner's punt, and the decoy. From the decoy-pond several *pipes* covered with hooped network extend in various directions. Wild ducks, widgeon, teal, &c. are induced to enter the wide mouths of the pipes by grain scattered near, by tame decoy-ducks,

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and with the help of a trained dog. Once in the pipes, they are easily forced along to the narrow end, where they are readily caught. Sir R. Payne-Gallwey, in *The Book of Duck Decoys* (1886), has collected particulars of 173 English decoys—a number, however, reduced to 39 at the time when he wrote, whilst since the passing of the Ground Game Act (1880) the average annual take in the Berkeley Castle decoys had sunk from 1370 to about 500 head. See also works by the Rev. F. O. Morris (1873) and Leffingwell (Chicago, 1888).

Wild Hunt (Ger. *Wilde Jagd;* also *Wüthenheer*), the name given by the German people to a fancied noise sometimes heard in the air at night, mostly between Christmas and Epiphany, as of a host of spirits rushing along, accompanied by the shouting of huntsmen and the baying of dogs. The root of the notion is doubtless to be found in the Christian degradation of the old heathen gods. Like Woden, the lord of all atmospheric and weather phenomena, and consequently of storms, the Wild Huntsman also appears on horseback, in hat and cloak, accompanied by a train of spirits—by the ghosts of drunkards, suicides, and other malefactors, often without heads, or otherwise mutilated. When he comes to a *cross*-road, he falls, and gets up on the other side. Generally he brings hurt or destruction, especially to any one rash enough to address him or join in the hunting cry, as many persons valiant in their drink have done. Whoever remains standing in the middle of the highway, or steps aside into a tilled field, or throws himself in silence on the earth, escapes the danger. In many districts heroes of the older or of the more modern legends take the place of Odin: thus, in Lusatia, Dietrich of Bern; in Swabia, Berchtold; in Sleswick, King Abel; in Lower Hesse, Charles the Great; in England, King Arthur; in Denmark, King Waldemar. The legend has also in recent times attached itself to individual sportsmen, who, as a punishment for their immoderateness or cruelty in sport, or for hunting on Sunday, were condemned henceforth to follow the chase by night. In Lower Germany there are many such stories current of one Hakkelberend, whose tomb even is shown in several places.

Another version of the Wild Hunt is to be found in the legend prevalent in Thuringia. There the procession, formed partly of children who had died unbaptised, and headed by Frau Holle or Holda, passed yearly through the country on Holy Thursday, and the assembled people waited its arrival, as if a mighty king were approaching. An old man with white hair, the faithful Eckhart, preceded the spirit-host to warn the people out of the way. In one form or other the legend of the Wild Hunt is spread over all German countries, and is found also in France, and even in Spain. In England we meet substantially the same notion in folklore—phantom dogs, like the black Shuck-dog of Norfolk and the Mauthe hound of Peel in Man, the 'Wisht Hounds' of Dartmoor, headless horses, a ghostly coach and horses swept along in a storm of wind. In Shropshire Miss Burne describes 'Wild Edric,' 'Squire Blount' with his coach and four, 'Madam Pigott' with her babe in her arms; Mr Henderson tells us of the 'Seven Whistlers' and the spectral pack called 'Gabriel's Hounds' which may still be seen, and more often heard, in the bleak and lonely moors of the North country. The latter are monstrous human-headed dogs which sweep through the air, and portend death or calamity to the house over which they hang. Mr Yarrell ascribes these weird sounds heard on dark nights to the bean-geese flocking southwards on the approach of winter, and Mr Buckland ascribes the strange rustling, rushing sound often heard in dark still nights of winter to the flight of the redwings. This sound is called the Herring Spear or Herring Piece by the Dover and Folkestone fishermen, who mostly count it as an omen of good success for their fishing, while the cry of the Seven Whistlers again they usually consider as a death omen.

Wilfrid, St, Bishop of York, was born in Northumbria in 634. He was brought up in the monastery of Lindisfarne, but at eighteen visited Rome, returning in 658 a warm partisan of the Roman party in the controversy with the native church on the shape of the tonsure and the time of keeping Easter. At the synod of Whitby (664) he contended against Bishop Colman, and succeeded in gaining over the king, who, learning it was only St Peter to whom the keys had been given, thought it most prudent to be on his side lest Peter should pay him out in his need by closing the gate upon him. Already he had been given the monastery at Ripon, and now he was chosen Bishop of York, being consecrated at Compiègne. On his return he found that Chad had been elected Bishop of Northumbria; but Archbishop Theodore restored Wilfrid. He improved the minster of York, built a splendid church at Hexham, some of the underground portions of which still remain, and raised a new minster at Ripon, the vault of which, called St Wilfrid's Needle, still exists. Theodore, without consulting Wilfrid, divided Northumbria into the sees of Lindisfarne, Hexham, and Whitherne, in addition to York, and Wilfrid made his appeal to Rome. On the journey he was driven by a storm to the coast of Friesland, the inhabitants of which were still pagan. Such was the effect of his preaching that thousands were baptised, and that work of conversion begun which was to be completed by Boniface and Willibrod. Pope Agatho decided in his favour, but King Ecgfrid flung him into prison. He escaped to Sussex, was allowed to return by the new king Aldfrid in 686, keeping the sees of York and Ripon. But again he appealed to Rome against the measures of the new primate, Berthwald (704), and was finally, after a council held near Ripon, allowed to keep Ripon and Hexham, but not York. He died at Oundle in Northamptonshire in 709, and was buried in Ripon.

The *Vita Wilfridi*, by Eddius, has been edited for the Rolls series by Canon Raine, in *Memorials of the Church of York* (vol. i. 1879). See also Dr W. Bright's *Chapters of Early English History* (1878).

Wilhelmshaven, the chief naval port of Germany, is on the west side of the entrance of the bay or gulf of Jahde, 45 miles NW. of Bremen by rail. The town, first projected in 1856, has been regularly laid out on a strip of ground bought by Prussia from Oldenburg in 1864, and was inaugurated by King William in June 1869. It is now a fortress of the first rank, defended by outlying forts and an elaborate system of torpedoes, and, with its moles, extensive basins, dry-docks, vast stores for the navy, and workshops for all the requirements of a fleet, has been a very costly creation—the massive buildings being erected on soft and swampy ground, without any natural advantage save its situation. Water has been obtained by means of artesian wells. A harbour for commercial purposes has been made to the south of and connected with the naval one; but the mercantile importance of Wilhelmshaven is yet in the future. Pop. (1885) 13,972.

Wilhelmshöhe. See Cassel.

Wilken, George Alexander, a distinguished ethnographer, was born, 13th March 1847, at Pomohen in Java, son of a missionary. After his education at Rotterdam, he served eleven years in the Dutch Indian Civil Service, returning home

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on furlough in 1880. The year after he became lecturer in the Leyden Municipal Institute. Already in 1884 the university had given him an honorary doctorate, and in 1885 he became its professor of the Geography and Ethnography of the Indian Archipelago. He died at Leyden, 28th August 1891. The essays on Indian ethnology and folklore in the *Indische Gids* and the *Bijdragen van het Koninklijk Instituut* possess a value quite unusual even in such publications. One article, for example, on spirit-worship among the races of the Indian Archipelago, alone extends to 256 pages. Others treat with unexampled fullness of knowledge and clearness of exposition native Dutch Indian theories of relationship and the laws of marriage and inheritance, marriage and betrothal customs, cretinism, the couvade, circumcision, &c. Also on matriarchy among the ancient Arabs he published a solid work in 1884. Vol. i. of a collected edition by Dr Pleyte appeared in 1892.

Wilkes, CHARLES (1798–1877), American naval officer. See TRENT AFFAIR.

Wilkes, JOHN, the second son of Israel Wilkes, a distiller at Clerkenwell, where John was born on 17th October 1727. He was educated first at Hertford under Mr Worsley, and second at Aylesbury under Mr Leeson, who accompanied him to Leyden as his tutor. Charles Townshend and Dowdswell, afterwards Chancellors of the Exchequer, and the Rev. Dr Carlyle were among his fellow-students at Leyden. He travelled through the Netherlands and a part of Germany before returning home. The acquaintances he made abroad were his introducers to fashionable society at home, where he became the boon companion of young profligates. He married to please his parents at the age of twenty-two, his wife being Miss Mead, the daughter of an eminent physician and an heiress. She was ten years his senior, and the union, as he phrased it, was 'a sacrifice to Plutus, not to Venus.' After a daughter had been born to them, the ill-matched pair agreed to live apart. Wilkes was one of a select and disreputable society, the Monks of Medmenham (q.v.), of which Sir Francis Dashwood, afterwards Lord Le Despencer, was the chief, and the Earl of Sandwich was a member. He was intimately acquainted also with some of the best men of the day, William Pitt and Lord Temple being among them. He agreed with Pitt's politics, and aspired to be his follower. An unsuccessful candidate for Berwick-upon-Tweed in 1754, he was returned to parliament for Aylesbury in 1757. Though not then a man of note, he filled positions of honour, being high-sheriff for Buckinghamshire, and first lieutenant-colonel and next colonel of the Bucks Militia. His electoral contests had involved the expenditure of £10,000, and he wished to serve his country in a lucrative office. Lord Bute having declined to appoint him ambassador to Constantinople or governor of Quebec, he vigorously attacked the ministry in the *North Briton* (1762–63), a weekly journal which he had founded. Before the twenty-seventh number appeared he was threatened with prosecution, while he had to atone for unpleasant references to Lord Talbot by fighting a duel with him. In the forty-fifth number some strong but not unjust comments were made upon the king's speech on opening parliament. Lord Halifax, one of the secretaries of state, issued a general warrant for the apprehension of all concerned in the article, which was deemed a libel. The person and papers of Wilkes were seized: after examination before Lords Halifax and Egremont, he was committed a close prisoner to the Tower. Lord Chief-justice Pratt, of the Common Pleas, ordered his release on the ground of privilege as a member of parliament. It was then held and afterwards determined that general warrants were unconstitutional, and that everything done in virtue of one was illegal. He obtained large damages at law for the indignities of which he had been the victim. His resistance and protests made him the hero of the hour; 'Wilkes and Liberty' became the cry of the people. But he had a private press at which some scandalous verses were printed for private circulation, and an inkling of this was obtained from the papers which were seized. The Earl of Sandwich read extracts in the House of Lords from the purloined copy of an 'Essay on Woman,' which was declared to be a most scandalous, obscene, and impious libel. The ministerial majority in the House of Commons expelled Wilkes on 19th January 1764 for being the reputed author of No. 45 of the *North Briton*. Before this he fought a duel with Mr Martin for words at which the latter took offence, and received a bullet in his belly. He was tried and found guilty during his absence from England for printing and publishing the 'Essay on Woman' (1763), of which a copy had never been made public, except by Lord Sandwich in the House of Lords, and he was outlawed for non-appearance. Returning to England in 1768, he became a candidate for the City of London, but failed, while a subsequent attempt to represent the county of Middlesex in parliament ended in his triumphant return. On his appearing before the Court of King's Bench his outlawry was reversed on a purely technical point, and the Lord Chief-justice afterwards sentenced him to twenty-two months' imprisonment and to pay a fine of £1000. While in prison he wrote a preface to a letter of Lord Weymouth in which he charged the secretary of state with instigating the massacre in St George's Fields, and this was declared a seditious libel and made the pretext for his expulsion from parliament. He was re-elected and, after his fourth election, the House of Commons declared him ineligible to sit, and admitted Colonel Luttrell in his stead. These high-handed proceedings against him increased his popularity. In 1771 he was elected sheriff for London and Middlesex; in 1774 he became Lord Mayor, was returned without a contest for Middlesex and re-entered parliament. In 1782 the resolutions invalidating his previous elections were expunged, on his motion, from the journals of the House. He had become chamberlain of the city in 1779; he retired from parliament in 1790, and died on 20th December 1797. His life was agitated and eventful. Since his day general warrants have never been issued, and the privileges of electors have been respected by parliament, while the liberty of the press owes much to him. He wrote pungently. His tastes were literary, and his acquaintance with the classics was wide. He wrote and spoke French with precision and fluency. If he had not been subjected to a persecution which was fomented by the king and conducted by his advisers he would have been less of a martyr and, possibly, of a patriot. Franklin said of him that if his moral character had been equal to that of the king he might have taken the king's place. But though his failings were many, his services to the country were considerable, and, while not one of the great men of his age, he was a far more useful personage than many who stood high in the peerage and in the good graces of George III.

See *Biographies of John Wilkes and William Cobbett*, by Watson; *Historical Gleanings*, by Rogers; *Papers of a Critic*, by Dilke; *Wilkes, Sheridan, Fox: the Opposition under George III.*, by the present writer; and *Life and Times of John Wilkes*, by Fitzgerald.

Wilkesbarre, capital of Luzerne county, Pennsylvania, on the left bank of the north branch of the Susquehanna (here crossed by a bridge), 18

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miles by rail SW. of Scranton. The city, which lies in the picturesque Wyoming Valley (q.v.), is famous for its mines of anthracite coal. It contains a large prison, and manufactures locomotives and railroad-cars, mining machinery and tools, iron castings, ropes, pottery, &c. Pop. (1870) 10,174; (1880) 23,339; (1890) 37,718.

Wilkie, SIR DAVID, painter, was born at Cults in Fifeshire, of which parish his father was minister, 18th November 1785. His boyish passion for art was too strong to be resisted by his father, who, with much reluctance, sent him in 1799 to study in the Trustees' Academy at Edinburgh. Here he greatly distinguished himself; and returning home in 1804, he painted his 'Pitlessie Fair,' a piece in which already his peculiar genius is pronounced. Shortly after Wilkie proceeded to London, intending to return to Scotland after a year or two of study; but the great success of his picture 'The Village Politicians,' exhibited at the Royal Academy in 1806, determined him to settle in the metropolis. Next year the 'Blind Fiddler' was produced. In 1809 he was elected an A.R.A., and in 1811 an R.A. In 1814, in company with his friend Haydon, he visited Paris, and inspected with great delight the art-treasures at the Louvre. In 1817 he made a run into Scotland, and, while the guest of Scott at Abbotsford, painted his well-known picture of the great poet and his family. During these years Wilkie had been engaged on the series of pictures on which mainly his fame rests; pictures familiar by engraving to every one ('Card Players,' 'Rent Day,' 'Jew's Harp,' 'Village Festival,' 'Blind Man's Buff,' 'Distraining for Rent,' 'The Penny Wedding,' 'Reading of the Will,' &c.), in which the homely humours of humble life are expressed by a vehicle appropriately simple, and of charming purity and transparency, his style including breadth, skilful technique, and elaborate finish. In this style, distinctively his own, his genius is commonly held to have culminated in 'The Chelsea Pensioners listening to the News of Waterloo,' which was painted during the years 1820–21. This work was a commission from the Duke of Wellington, who paid the artist 1200 guineas for it. Subsequently he changed his style, sought to emulate the depth and richness of colouring of the old masters, and deserting the homely life, which he could treat so exquisitely, chose elevated, and even heroic subjects, to the height of which he could never rightly raise himself. The florid picture, painted in 1830, of 'George IV. entering Holyrood,' which, though not without its fine points, can delight no one but a flunkey, gave the first hint of the change; and no doubt a tour on the Continent, including Italy and Spain, which he made for his health in 1824, did something to stimulate the new and unwise ambition. By common consent it has been adjudged unwise; and Wilkie remains, and will remain, memorable not for the quasi-high art of his later years, but for the simpler and truer art of his earlier time. To his later period belong the 'Princess Doria,' 'The Maid of Saragossa,' 'The Two Spanish Monks,' 'The Preaching of John Knox,' 'Columbus in the Convent,' 'Napoleon and Pius VII.,' and 'Queen Victoria at her First Council.' He also painted portraits in some respects admirable, and was successful as an etcher. He never ceased to be popular, and honours continued to be showered upon him. On the death of Sir Henry Raeburn, he succeeded him as Limner to His Majesty; in 1830 he was made Painter in Ordinary to His Majesty, in room of Sir Thomas Lawrence deceased; and in 1836 the honour of knighthood was conferred upon him. Wilkie had never been robust, and his health now began to give way seriously. In 1840, seeking to re-establish it, he once more left England; but he did not find what he sought. Having visited Syria, Palestine, and Egypt, he died on his voyage home (1st June 1841), off Gibraltar, and his body was committed to the deep.

As an illustrator of Scottish character and manners in humble life, Wilkie in his best pictures may take rank with Burns in poetry, and Scott in fiction. As a man he was kindly, warm-hearted, and of essential generosity of disposition. See the Life by Allan Cunningham (3 vols. 1843), Redgrave's *Century of Painters*, and a short Memoir by J. W. Mollett (1881).

Wilkins, JOHN, Bishop of Chester from 1668 till his death, was born near Daventry in Northamptonshire in 1614, son of an Oxford goldsmith. At thirteen he was admitted at New Inn Hall, whence he shortly removed to Magdalen Hall, graduating B.A. in 1631. As chaplain successively to William, Lord Say, George, Lord Berkeley, and Charles, Count-palatine of the Rhine, he found time for studies in mathematics and mechanical philosophy, and aided in those meetings in London out of which grew the Royal Society. He sided with the parliament, and was appointed Warden of Wadham College. In 1656 he married Robina, widow of Peter French, and sister of Oliver Cromwell, and in 1659 was appointed by Richard Cromwell Master of Trinity College, Cambridge. Dispossessed at the Restoration, he soon recovered court favour and became preacher at Gray's Inn, rector of St Lawrence Jewry, Dean of Ripon, and Bishop of Chester. He died November 19, 1672. As an ecclesiastic he was tolerant and moderate, and indeed looked little better than a trimmer to the zealots, and even the eulogy of that pedantic old Tory, Anthony Wood, is coloured with a characteristic touch of malice—'there was nothing deficient in him but a constant mind and settled principles.' His name now survives only in his curious treatises: *Discovery of a New World* (1638), which gravely discusses the possibility of communication by a flying-machine with the moon and its supposed inhabitants; *Discourse concerning a New Planet* (1640), an argument that our earth is one of the planets; *Mercury, or the Secret and Swift Messenger*, showing how a man may with privacy and speed communicate his thoughts to a friend at any distance; *Mathematical Magic* (1648); *Essay towards a Real Character and a Philosophical Language* (1668), founded on Dalgarno's treatise. His theological writings are forgotten.

Wilkins, PETER. See PALTOCK.

Wilkinson, SIR JOHN GARDNER, Egyptologist, was born at Hardendale in Westmorland, 5th October 1797, had his education at Harrow and Exeter College, Oxford, and in October 1821 set out for Alexandria to devote himself to exploration. Making Cairo his headquarters, he travelled through and investigated almost every part of Egypt and Lower Nubia, twice ascended the Nile as far as the Second Cataract, spent a year at Thebes alone, and visited also the deserts on either side of the river, and the Egyptian oases, making indeed in these twelve years a complete survey of Egypt, and transmitting to the British Museum more than three hundred antiquarian objects. His *Materia Hieroglyphica* (1828), its supplement, devoted to Thebes alone (1830), and his *Topographical Survey of Thebes* (1830) he published during his first stay in the country. Next followed his *Topography of Thebes* (1835), and his famous work, *Manners and Customs of the Ancient Egyptians* (3 vols. 1837), with its complement on the Religion and Agriculture (2 vols. and a vol. of plates, 1841). A new edition of the *Manners and Customs*, uniting both the original series, was

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edited by Dr Birch (3 vols. 1879). Wilkinson, who was knighted in 1839, again visited Egypt in 1841 and in 1843, as well as Syria, Constantinople, Tunis, Sicily, Dalmatia, and Montenegro. He paid a fourth visit to Egypt in 1848, a fifth in 1855, presented his collection of coins and antiquities to Harrow, and died 29th October 1875. Wilkinson's other works include books on Dalmatia, travellers' handbooks to modern Egypt, ancient Egyptian architecture, &c., together with the Egyptian notes to Rawlinson's *Herodotus*.

Will is, in English law, a disposition of property, made to take effect at the owner's death, and revocable at any time during his life. Though, by the Wills Act of 1837, a writing is indispensable to a will, yet there is an exception in the case of soldiers or sailors, who, from their occupation, and while in actual service, are allowed to make a verbal or nuncupative will; this exception, however, extends only to their personal estate, for they must make a written will, like other persons, in order to deal with their real estate. An infant, or person under twenty-one years of age, cannot, since 1838, make a will. A married woman can make a will only if she has separate property, or her husband assents to her will, or she makes the will by virtue of some power of appointment vested in her. As a general rule, it is absolutely necessary that the party making a will should have a free and disposing mind at the time; and hence if he or she is a lunatic, or drunk, or acting under compulsion, fear, or undue influence, the will is invalid. There is no limit as to the time preceding death when a will may be made: it is enough that the testator was at the time capable and sensible, though he died immediately after. A will must be executed in presence of two witnesses, who see the testator sign the will, or at least hear him acknowledge it. But there is no particular form of words in which a will must be made for the purpose of disposing either of realty or personalty. The will must be in writing, but it need not be in ink or written continuously. The testator may sign by his mark or by an assumed name. Though a seal is not equivalent to signature, yet a person may have a stamp to sign papers with, and that will be sufficient for a will also. The testator need not sign the will if he authorise some one to do so for him in his presence. The signature must be at the foot or end of the will; but if it is placed so as to lead a court to the conclusion that it was intended to give effect to the will, that will be enough. Though the witnesses need not know it is a will, they must be present together when the testator signs it or acknowledges his signature. The witnesses must sign their names or make their marks. A legatee, or the wife or husband of a legatee, may be an attesting witness, but by being so will forfeit any legacy left by the will. But one may be an executor though he attests the will. A will is revoked by the marriage of the testator or testatrix. The mere fact of making a subsequent will does not of itself operate to revoke a prior will, unless there is some inconsistency in whole or in part; and, as a general rule, no will will be revoked by any presumption of an intention on the ground of an alteration in circumstances. The usual way of revoking a will is to burn, tear, or destroy it with the intention of revoking the same; or to execute another will which expressly revokes the prior will. When a testator tears or cuts away that portion of his will containing the signature and attestations, the presumption is that he intends to revoke the whole. But merely cutting out a part of the will, or striking it through with a pen, does not amount to a revocation. It is to be borne in mind that, in order to revoke by tearing, &c., there must be an intention to revoke, so that a mere accidental tearing will not amount to revocation. When there are interlineations or alterations in a will, it is presumed these are made after signature, unless there is evidence to prove the contrary. A will which is in any manner revoked can only be revived by re-execution, or by a codicil showing an intention to revive it; but many nice questions have arisen as to what causes a will to revive.—In Scotland a will is used only to denote a testament affecting personal or movable property; while a will affecting real or heritable property can only be made by way of a deed having a present operation. A will or testament may be written in the handwriting of the testator, and if signed by him will not require witnesses, being then called a holograph will. In other respects wills are subject to nearly the same rules which prevail in England with respect to revocation &c. Wills of real property are called Dispositions or Deeds, and have a present operation, and the mode in which they are drawn up is that of conveying the property to the disponee, but reserving the testator's liferent. The effect of this is that the testator retains the property in his own hands while he lives; but the moment he dies, the disposition *mortis causa* comes into play, and the disponee then takes the property, subject to the deed (see DEED). In the United States the general principles of the law relating to wills are for the most part of English origin, but the laws of the states vary widely as to the forms required in making a will, &c. In ancient times wills were sometimes enrolled for preservation among the records of a superior or local court, but the episcopal registry in each diocese was the usual place of deposit until by the act which established the Court of Probate in 1857 a principal registry was created at Somerset House, and forty district registries throughout the country. When a will is deposited in a district registry a copy is sent to Somerset House. To the principal registry were transferred the wills deposited in the Prerogative Court of Canterbury since 1383, and those of several other jurisdictions. Any will of a deceased person at Somerset House may be consulted on payment of a fee of one shilling, but readers are not allowed to copy the provisions of a will; official copies may be obtained at a small expense. The will of a living person may be deposited for safe keeping (not, of course, for consultation), but very few testators take advantage of this arrangement. See CODICIL, DEED, EXECUTOR, FORGERY, LEGACY, PROBATE; treatises on wills and will-making by Jarman, Tudor, Theobald, Flood, Davidson; for Scotland, M'Laren; and for the United States, Redfield or Schouler, and Stimson's *American Statute Law*.

Will. Mental phenomena are commonly arranged in the three orders or classes of Cognition, Feeling, and Will. The first includes all the ways in which facts and relations become known; the second refers to the way in which the mind is affected as regards pleasure and pain; to the third, or Will, belong all those mental states in which the mind or subject is regarded as producing changes either in the state of mind itself or in its bodily environment. The movements thus produced are called voluntary, and the mental acts producing them volitions. The term Will may thus be said to refer to the active side of mind. But to make this clear the term 'action' needs limitation. It does not refer to what we know as action in the physical world—e.g. the action of a billiard-cue on the ball: psychologically this process is for us only a certain orderly change of presentations. Further, many of our organic actions and bodily movements are not actions in the psychological sense of the word, seeing that they are not mentally initiated. Spontaneous, Reflex, and Instinctive actions, even

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when accompanied by a mental element—sensation or feeling—can be traced solely to certain organic conditions, and do not proceed from a mental initiative: the movement has not been preceded by an idea of the movement. In this way we reach a mark of distinction between the non-voluntary and the voluntary. In volition the movement is preceded by an idea of its 'end;' and this end is further so connected with the emotional nature of the subject that its attainment gives satisfaction or pleasure, and the failure to attain to it is the cause of dissatisfaction or pain. Hence also the mental changes which do not possess these characteristic marks, but are due to the occurrence of new sensations or to the mechanism of association, belong to the class of the non-voluntary.

If, however, in accordance with what has just been said, an act of will be allowed to involve both an ideal element and an element of feeling, it follows that the phenomena of will cannot be marked off as an entirely distinct class from those of cognition and feeling. Elements from these latter classes enter into and go to determine the nature of volition. The question therefore arises whether there is any ultimate volitional element, equally fundamental in consciousness, with the element of presentation in cognition, or of pleasure or pain in feeling. If there is such an element, then we may expect to find it entering into cognitive and emotional states of mind just as presentation and feeling enter into volition. Various attempts have been made by psychologists to account for the phenomena of volition without admitting any will-element as an ultimate constituent of consciousness. Sometimes these theories have been mainly physiological in nature; but as such they go no further than to trace the development of the organic processes which accompany volition. These organic processes themselves, in so far as they enter consciousness at all, only enter it as motor presentations. A psychological account of volition which denies its ultimate character must therefore trace it either to presentation, or to feeling, or to their combination. On the other hand, those psychologists who contend for the ultimate character of the will-element in consciousness need not be satisfied with pointing out the difficulties which opposed theories fall into. They may contend that the will-element is assumed by them at starting along with their conception of presentation and of a complex of presentations. The question is thus apt to fall back upon the still more fundamental question as to whether a presentation *per se* is intelligible. If we may assume that a presentation which is presented to no one, or is the object of no subject, is an impossible beginning for mental development, then with presentations we must assume a subject to which they are presented. It is with the recognition of this assumption of a Subject that we seem to reach the crucial point in the doctrine of will. It is admitted that such cognitive processes as reasoning and perception are also active processes—i.e. that they involve will; and it is contended by some that even in presentation the subject is not to be regarded as entirely passive, but is to be looked upon as reacting upon the presentation in attending to it. Hence those psychologists who hold to the view that there is a will-element in consciousness equally ultimate with the cognitive element and the feeling-element, also frequently look upon Attention as the expression of that element, and upon the 'movements' of attention, or its continuous redistribution over the content of consciousness, as the fundamental act of will. And in this connection it may become apparent that the psychological question runs into and involves a philosophical view of the subjective activity to which simple presentation as well as rational choice is due. From this point of view also we see how will has come to be specially identified with the self or person, so as to admit of its being said that the will *is* the man.

The disputed questions concerning the mode of voluntary action have been generally discussed either as a part of, or in more or less express connection with, the time-honoured controversy concerning the Freedom of the Will. This controversy arose out of ethical and, still more, theological discussions, rather than from purely psychological analysis. The way for the question was opened by Aristotle's investigation of the opposition between the voluntary and involuntary, and by his criticism of the older Socratic position that good only is voluntary and evil involuntary. By the application subsequently of the Stoical doctrine of a universal necessity or fate to the question of human volition a further step was taken towards opening up the controversy which has to so great an extent dominated modern psychology and ethics. Christian theology introduced alongside of the traditional philosophy of Greece a new conception of the relation between God and man, with the attendant conceptions of sin and grace. And from this new conception there soon emerged a twofold drift of thought, according as emphasis was laid on the holiness or on the power of God. From the former point of view it was necessary to free the conception of God from the stain of the evil in the world, and especially in human conduct; and accordingly a certain independence, a power of disobeying the divine law or of sinning, was attributed to the human will. In this way the 'freedom of the will' came to be defended by early Christian writers (e.g. Justin Martyr, Tertullian) against the fatalism which traced both good and evil to God. On the other hand, the conception of the divine omnipotence dominated the Christian philosophy of St Augustine. The Christian doctrine of salvation was made to hinge not on the individual will, but on the divine grace which freely elects to salvation and leads the wills of the elect from sin to repentance, faith, and holiness. This theory of predestination was afterwards more strictly formulated by Calvin, and through his influence became the creed of the Reformed churches. It is noticeable, however, that St Augustine, if not Calvin also, seeks to defend the justice of God by ascribing free-will to Adam, who, as progenitor and representative of the human race, is represented as having lost the power to will the good, and—for himself and his descendants—come under the sway of evil until drawn from it by irresistible grace. The arguments drawn from the theory of predestination for the most part hold with equal force against free-will before or after the fall, and in one of the ablest treatises against the common notion of the Freedom of the Will, that by Jonathan Edwards, the arguments adduced are quite general in their application. The Free-will controversy, as discussed between Augustine and Pelagius, has revived with each new discussion of dogmatic theology; and from theology the metaphysical and psychological questions involved have passed into the schools of philosophy. Thus from Descartes to Lotze there is hardly a great thinker who has not attempted on one side or the other, or by way of compromise, to solve the question. The psychology of the question has been discussed with great fullness by the English and Scottish psychologists. While Reid, Stewart, Hamilton, and H. L. Mansel maintain the doctrine of Free-will, the theory of Necessity—or, as they mostly prefer to call it, Determinism, emphasising thus the observed invariable sequence of act upon motive rather than

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any necessary connection between them—is supported by Hobbes, Hume, Priestley, James Mill, J. S. Mill, and Bain. The view of Locke, as expressed in his subtle but intricate chapter on 'Power' in the *Essay*, is that the will, or rather the man, is moved to act by the most pressing uneasiness; and his theory would therefore be called determinist did he not subsequently assert that, in order to prevent precipitate determination, 'we have a power to suspend the prosecution of this or that desire,' and that 'in this seems to consist that which is (as I think, improperly) called *free-will*.'

The clearest view of the whole controversy may perhaps be obtained by passing shortly in review J. S. Mill's discussion of the subject in his *Examination of Sir W. Hamilton's Philosophy*. The meaning of his doctrine is first explained. To begin with, he argues that Determinism does not imply materialism; man may be a spiritual being, but yet subject to the law of causation, 'his volitions not being self-caused, but determined by spiritual antecedents (e.g. desires, association of ideas, &c., all of which are spiritual if the mind is spiritual) in such sort that when the antecedents are the same the volitions will always be the same.' Further, he contends that Determinism does not mean fatalism: neither the pure or Asiatic form of fatalism which holds that our actions do not depend on our desires, but are overruled by a superior power, nor the modified form of fatalism which 'holds that our actions are determined by our will, our will by our desires, and our desires by the joint influence of the motives presented to us and of our individual character, but that, our character having been made for us and not by us, we are not responsible for it, nor for the actions it leads to, and should in vain attempt to alter them.' The 'true doctrine of the causation of human actions' rejects this conclusion, and maintains 'that not only our conduct but our character is in part amenable to our will,' and 'that we can by employing the proper means improve our character.' The 'necessity' involved in human action simply comes to this, that any one who 'knew perfectly our character and our circumstances' could predict our actions.

The arguments for this theory of Determinism may be reduced to two: that from the universality of the connection between cause and effect, and that from the constant presence of motives in volition. The theory of determinism inferred, by Mill and most English psychologists, from these considerations, is that the action is the outcome of motives, the weight or strength of motives being further determined by their pleasure-value—that is to say, from the point of view of feeling alone. It is noticeable, however, that a very different, though still determinist, theory of volition has been elaborated by Herbart. His psychology, in spite of the widely different philosophical principles from which it starts, has many points of similarity with that of the English Associationists; but his treatment of volition differs from theirs by attributing the motive-force which governs action not to pleasure and pain but to presentations themselves, from the interaction of which volition is held to be a special development. Whereas Mill looks upon will as issuing from desire, and desire as a conscious tendency towards pleasure—a view expressed by the old dictum, *nihil appetimus nisi sub specie boni*—the Herbartian psychologists put forward a view of will which disconnects it from the representation of an object as pleasurable.

On the other hand, the arguments for the theory of free-will may also be reduced to two: the argument from the consciousness of freedom, and the moral argument. Regarding the argument from consciousness Mill says that 'to be conscious of free-will must mean to be conscious before I have decided that I am able to decide either way.' And this power he denies on the ground that 'consciousness is not prophetic;' 'consciousness tells me what I do or feel. But what I am *able* to do is not a subject of consciousness.' We may have a conviction afterwards that we could or should have chosen the other course, but only by supposing 'a difference in the antecedents. We picture ourselves as having known something which we did not know, which is a difference in the external inducements, or as having desired something or disliked something more or less than we did, which is a difference in the internal inducements.' The moral argument, so far as it refers to the connection between freedom and responsibility, is also dealt with by Mill. Moral responsibility, he contends, does not imply freedom, for 'responsibility means punishment.' Punishment is a motive to action, and 'proceeds on the assumption that the will is governed by motives.' The consciousness of 'deserving punishment' which is, he adds, bound up with the feeling of responsibility, 'is nothing else than our knowledge that punishment will be just'—i.e. fitted to prevent us from infringing the rights of others. It is on these latter points that Mill's views may most probably seem insufficient. With regard to the consciousness of freedom, so careful an observer as Sidgwick gives a different interpretation of the facts. 'In the case of actions,' he says, 'in which I have a distinct consciousness of choosing between alternatives of conduct, one of which I conceive as right or reasonable, I find it impossible not to think that I can now choose to do what I so conceive, however strong may be my inclination to act unreasonably, and however uniformly I may have yielded to such inclinations in the past. This belief seems to me bound up with the belief that I *ought*, in the strictest sense, to choose any course.' And Mill's explanation of responsibility, and of the connected notion of moral obligation, is not so much a justification of these notions as the construction of a new meaning for the old words which may serve all social requirements. The ordinary notion of moral responsibility seems to involve the recognition of a law as binding on conduct, or of an ideal which ought to be realised in it: even apart from consideration of the punishment which may follow a breach of the law or disregard of the ideal.

The ethical aspect of the question of free-will thus becomes apparent. It is most pronounced in the system of Kant, in which the free will comes to be identified with the moral law itself. On the other hand, Sidgwick maintains that, while the ordinary notions of moral obligation and moral responsibility imply the conception of free-will, the content of morality is independent of it, that no decision on the question is required before deciding what it is right or reasonable to do in any circumstances, and that the freedom of the will is therefore not a necessary postulate of ethical theory. Some idea of the different ways in which the question of free-will enters into a philosophical construction of things, and of the different solutions of which it is capable, may be given by indicating very briefly the way in which it was dealt with by three philosophers who may be selected as typical of different modes of thought—Spinoza, Kant, and Lotze. Spinoza decides the question from the point of view of a monistic conception of things—i.e. he conceives the universe as one and manifesting a single necessary law in its various modes. There is therefore no such thing as contingency either in man or nature. Belief in free-will is simply a result of ignorance. Men think themselves free because conscious of their

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actions but ignorant of the causes of these actions. Kant's treatment of the question is an attempt to reconcile determinism with freedom. The causality of nature which binds effect to cause in unbroken chain must be recognised to hold not only of the physical world, but also of the mental sequence of motive, desire, and act. But while this conception rules our experience, it is still possible to look upon the whole series of sense-phenomena—i.e. the whole causality of nature—as itself an effect of the causality of freedom. This idea is indeed only a regulative idea giving method and plan to our knowledge, and not entering into knowledge. Further importance is given to it, however, when we enter upon ethical considerations. The moral law, which requires absolute obedience, implies (unless our nature contradict itself) that such obedience can be rendered. Free-will thus implied by the moral law would conflict with the causality of nature if conceived of as operating in time. It is only thinkable as the law of an intelligible world (from which the sensible world may be said to proceed), and as thus at once reason, law, and will. Will is therefore free not only because above the causality of nature, but because it is autonomous or a law to itself. The weakness of this theory, however, lies in the opposition between the intelligible and sensible worlds. Kant has no means of showing how intelligible freedom may manifest itself in the development of actual character. He asserts at once the constancy of causal connection and the ethical worth of free-will; but no real harmony between the two is brought about. To hold fast the conception of law in mental phenomena—which recent psychology has made increasingly manifest—and at the same time to assert and harmonise with it the rational conviction that a place must remain for freedom, is the endeavour of Lotze. Volition, he contends, contains a peculiar element of mental activity not derived from presentation or feeling, though dependent upon them for its appearance. 'Will can have no content other than that supplied by the involuntary flow of ideas and feelings,' but 'we are convinced that we meet with an act of will only where the impulses urging to action are apprehended in distinct consciousness, and where the decision whether they shall be followed or not is deliberated upon and is left to be determined by free choice of the mind.'

Full treatment of the subject of Will is given in most of the psychological treatises quoted in the article PSYCHOLOGY, to which must now be added Sully, *The Human Mind* (2 vols. 1892), which gives a very complete and discriminating account of the whole subject. Amongst recent works of physiological psychology may be mentioned G. H. Schneider, *Der thierische Wille* (1880), *Der menschliche Wille* (1882); Th. Ribot, *Les Maladies de la Volonté* (1882); H. Münsterberg, *Die Willenshandlung* (1888). To the Hegelian influence is due the work of W. Vatke, *Die menschliche Freiheit in ihrem Verhältniss zur Sünde und zur göttlichen Gnade* (1841). Lotze's view is worked out and defended by H. Sommer, *Ueber das Wesen und die Bedeutung der menschlichen Freiheit* (1882). A useful outline of different views, and references to literature, are given by O. Külpe, *Die Lehren vom Willen in der neueren Psychologie* in Wundt's *Philosophische Studien* (vol. v. 1889). Historical accounts of the free-will controversy are given in Bain's *Mental and Moral Science*, pp. 406–428, and Volkmann's *Lehrbuch der Psychologie*, sect. 151. See also the controversy between W. G. Ward, A. Bain, and S. H. Hodgson in *Mind*, vols. v. and vi., and the articles therein referred to, and Hodgson in *Mind*, vol. xvi. pp. 161 ff. For Schopenhauer's view of will as the ultimate principle of things, see SCHOPENHAUER.

Willemstad, capital of Curaçao (q.v.), with considerable transit trade as a free port.

Willet (*Symphemia semipalmata*), a North American bird of the snipe family, also called Stone Curlew. It belongs to the tattler group, and is semi-palmate (its toes being half-webbed). Found plentifully as far north as 56°, it winters in the southern states.

William I., king of England, called the Conqueror, bastard son of Robert III., Duke of Normandy, by Arletta, daughter of a tanner of Falaise, was born at Falaise in 1027 or 1028. News of his father's death on pilgrimage having reached Normandy in 1035, the nobles accepted him as duke. Many of them, however, rebelled against him, and were helped by his feudal superior, Henry I. of France. His guardians were faithful to him, but three of them were murdered, and his youth was passed in the midst of difficulty and danger. In 1047 the lords of the western, or Danish, part of the duchy rebelled, and William nearly fell into their hands at Valognes. King Henry came to his help, and the king and duke defeated the rebels at Val-ès-dunes. This victory established William's power in Normandy. He ruled his duchy vigorously, and won two fortresses on the frontier of Maine. In 1051 he visited his cousin, Edward the Confessor, the English king, and received from him a promise that he should succeed him in England. He married Matilda, daughter of Baldwin V., Count of Flanders, in 1053, though the marriage had been forbidden by the pope on the ground of consanguinity. Lanfranc, Abbot of Bec, reproved him for this marriage, and William ordered him to quit the duchy, but was quickly reconciled, and Lanfranc prevailed on the pope to confirm the marriage, William, as an atonement, building the abbey of St Stephen, and Matilda the abbey of the Holy Trinity, both at Caen. In the next ten years William repulsed two French invasions, and in 1063 conquered the county of Maine. Probably in 1064 Harold, Earl of Wessex, was at his court, and swore to help him to gain the English crown on Edward's death. When, however, Edward died, in 1066, Harold became king. William laid his claim before the pope and western Christendom; he was the last king's kinsman; Edward had promised him the crown; Harold had broken his oath. Warriors joined him from many lands; the pope approved his claim, and by sending him a consecrated banner invested his expedition with something of the character of a crusade. On 14th October he defeated Harold at the battle of Hastings, at a place called by one chronicler Senlac, where he afterwards built Battle Abbey. Harold was slain, and William, having received the submission of the English nobles, was crowned king on 25th December.

England, however, was not yet subdued, and, after a visit to Normandy, William set about completing the conquest. The west and north were subdued in 1068, but the next year the north revolted, and William cruelly devastated the whole country between York and Durham. In 1070 the conquest was completed. The king everywhere confirmed his power by building castles. Although the English generally were allowed to redeem their lands, those who resisted him suffered confiscation. With the confiscated lands he rewarded his followers, granting them to be held of himself, perhaps by military service, though this is contrary to the opinion of some eminent historians. While William made little formal change in the law, the constitution under him assumed a feudal aspect, the old national assembly becoming a council of the king's tenants-in-chief. But he was careful to guard against the evils of continental feudalism; all title to land was originally derived from his grant; he distributed his grants to his great lords over several counties, and in 1086 he exacted an oath of fealty from all landowners, whether holding

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immediately of him or of other lords. Domesday Book, compiled by his order in that year, contains the record of the land settlement, and of the value of the land for fiscal purposes. The chief result of William's system was a large increase in the power of the crown. He brought the English Church into closer relations with Rome, using the papal authority to forward his own policy with respect to it, while he resisted all interference derogatory to his sovereignty, laying down rules defining the rights of the crown with reference to the papacy, and refusing a demand of homage made by the pope. The intimate union between the church and state in matters of jurisdiction and legislation characteristic of the old English system was abolished, church synods were frequently held, and ecclesiastical causes were removed from the sphere of the lay courts. William's policy, which was ably carried out by Lanfranc, Archbishop of Canterbury, while raising the character of the church, gave the papacy a stronger hold upon it, and tended to endanger the royal authority over it should the throne be occupied by a less capable ruler, or should a dispute arise between the church and the crown. The Conqueror, however, was supreme both in church and state. His rule was stern and orderly; he was greedy of money, and, though not wantonly cruel, careless of human suffering. Passionately fond of hunting, he devastated a large tract in Hampshire to form the New Forest, and heavily punished any breach of his forest laws. All offences were severely dealt with, and mutilation was frequently inflicted, but he forbade capital punishment.

Revolts were made against William both in England and on the Continent. In 1070 there was a rebellion in the Fen Country; the hopes of the rebels were excited by the coming of a Danish fleet, and under the leadership of Hereward they for some time defended the Isle of Ely against the king. English exiles were sheltered by the Scottish king Malcolm, who plundered the northern shires; but William in 1072 crossed the Forth, and compelled Malcolm to make peace and to do him homage at Abernethy. In 1073 he reconquered Maine, which had revolted from him. During his absence in Normandy in 1075 the foreign earls of Hereford and Norfolk rebelled, and a Danish fleet appeared in the Humber. The English, however, were faithful to the king, and the rebellion was quickly suppressed. Waltheof, the English earl of Northumbria, had for a moment been implicated in the plot, and William, who put no one else to death for a political offence, had him beheaded. He made a successful expedition into South Wales, penetrating as far as St Davids. In his later years he engaged without success in some small wars in France. His eldest son, Robert, rebelled against him in Normandy in 1079, defeated and wounded his father at Gerberoi, and went off into France. Having entered on a war with Philip I. of France in 1087, William burned Mantes. As he rode through the burning town his horse stumbled, and he received an injury of which he died at Rouen on 9th September. He left Normandy to his son Robert, declared his wish that his next surviving son William should succeed him in England, and gave his youngest son Henry a sum of money. He was buried in the abbey church that he had built at Caen (q.v.).

See 'William of Poitiers,' 'William of Jumièges,' and 'Orderic,' in Duchesne's *Hist. Normann. Script.*; *Saxon Chronicle*, ed. by Plummer; William of Malmesbury's *Gesta Regum* (Rolls series); *Roman de Rou*, ed. by Andresen; and modern authors—Freeman's *Norman Conquest*, ii. iii. iv., and *William the Conqueror*, in 'Twelve English Statesmen' series; Palgrave's *England and Normandy*, iii.; Stubbs's *Const. Hist.*, i.; Gneist's *Const. Hist.*, i.; Round's 'Introduction of Knight Service' in *Engl. Hist. Rev.*, Nos. 23, 24, 25. See also BAYEUX TAPESTRY, DOMESDAY, FEUDALISM, HAROLD, HASTINGS, LANFRANC.

William II., king of England, called Rufus, third, and second surviving, son of William the Conqueror, was born before 1066. On his father's death in 1087 he was crowned king at Westminster. The next year many of the Norman nobles in England, with the king's uncle Odo, Bishop of Bayeux and Earl of Kent, at their head, rebelled against him, in favour of his eldest brother Robert, Duke of Normandy; for they knew that Rufus would be a stern master, whereas in Robert they would have a king that would not trouble himself to enforce order. Rufus appealed to the English people for help, promising them good government and a relaxation of the forest laws and of fiscal burdens. They flocked to his standard, the bishops upheld his cause, and the rebellion was suppressed. He did not keep his promises; he taxed the people heavily, maintained the forests, and punished offences against the forest laws with death. He was an able man and a strong ruler, but was violent, boastful, profane, and unspeakably immoral. Always full of magnificent designs, he lacked stability of purpose, and consequently his achievements, though great in themselves, fell short of his plans. He largely employed mercenary soldiers, and allowed them to ill-use his people. By the agency of his justiciary, Randolf Flambard, he oppressed his tenants-in-chief by abusing his rights as feudal lord, making them pay him excessive sums by way of 'relief' on entering on their estates, and so on. The lesser people groaned under the harsh administration of the law, and seem to have had to suffer to make good what the king took from their lords. Treating ecclesiastical benefices as far as possible like lay fiefs, Rufus sold them, and kept them vacant, seizing their revenues during vacancy. Besides other bishoprics the see of Canterbury had been vacant for four years when, in 1093, he fell sick, repented, and appointed Anselm, a holy and learned man, to the archbishopric. When Rufus recovered he resumed his evil life, and quarrelled with Anselm because he maintained the rights and liberties of the church. At the Council of Rockingham, where in 1095 the king tried to crush his resistance, the primate, though deserted by his suffragans, was defended by the lay lords; but in 1097 Anselm, despairing of justice in England, departed to lay his cause before the pope, and did not return again until after the king's death.

Mindful of the trouble that Robert had brought upon him in England, Rufus made war upon him in Normandy, where the duke's lax rule had led to much confusion. Peace was made in 1091, and the duke and king joined in besieging their brother Henry in Mont St Michel, and forced him to surrender. In 1094 Rufus again invaded Normandy, which was rent by private wars. Impatient of his strong rule, some Norman lords in England, headed by Robert of Mowbray, Earl of Northumberland, raised a rebellion against him at home, which was speedily crushed. His power was strengthened in 1096 by the acquisition of Normandy, which was mortgaged to him by the duke, and which he soon brought into order. The feudal lords in England were no longer able to expect help against him from Normandy, and he gained a double hold over such of them as had lands on both sides of the Channel. The acquisition of Normandy led him to make an attempt to conquer the adjoining French district of Vexin, but in this he was unsuccessful. In 1098 he reconquered Maine, which Robert had lost. The next year its former count, Helias, recovered it, and

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Rufus, though he again invaded Maine and won back its capital, Le Mans, did not complete the reconquest of the county. This was characteristic of him; he had wonderful energy, but little perseverance, and after entering on a war with vigour would let it die out before he had fully accomplished his purpose. At home he enlarged his kingdom by the conquest of Carlisle and its district from its Scandinavian lord. This conquest probably offended Malcolm, king of Scotland, who invaded Northumberland in 1093, and was slain at Alnwick. Rufus upheld the right of Malcolm's eldest son Duncan, who had lived at his court, against his uncle, and later favoured the cause of Duncan's half-brother Edgar, who, after gaining the kingdom, remained on good terms with England. Rufus thrice invaded Wales, twice with signal ill-success, and, finding that he could not subdue it by leading an army against it, built castles on the borders. The lords of the border castles kept up a continual warfare with the Welsh, conquering the land piecemeal without costing the king anything. Towards the end of the reign, however, the Welsh won back some districts that they had lost. In 1100 Rufus was planning the acquisition of Aquitaine, which its duke proposed to pledge to him. But as he was hunting in the New Forest on 2d August he was slain accidentally, as is most probable, by an arrow shot by one of his companions named Walter Tirel. He was buried in Winchester Cathedral without any religious service; for his wickedness had been great, and men looked on his death as a judgment of God. He was never married.

See 'Orderic,' ed. by Duchesne; Eadmer's *Hist. Nov.*, ed. by Migne; *Saxon Chronicle*, ed. by Plummer; 'Henry of Huntingdon' (Rolls series); William of Malmesbury's *Gesta Regum* (Rolls series); and modern writers—Freeman's *Reign of William Rufus*; Lappenberg's *Norman Kings*, ed. by Thorpe.

William III. was the posthumous son of William II. of Orange (1626–50) by Mary (1631–60), the eldest daughter of Charles I. of England. He was born at the Hague on 4th November 1650. The alliance of his house with the Stuarts aroused the jealousy of Cromwell; and by his influence the baby-prince and any of his lineage were declared to be excluded from the Stadtholdership of the United Provinces. The restoration of Charles II. in England improved his nephew's prospects; and on the murder of De Witt in 1672 (a murder at which William connived) he was chosen Stadtholder. The republic was at this time carrying on an apparently hopeless contest with its powerful neighbour, Louis XIV. of France; but by the valour and wisdom of the young Stadtholder, who announced his readiness 'to die on the last dyke,' the war was in 1678 terminated by the treaty of Nimeguen in a manner advantageous and honourable for the United Provinces. On 4th November 1677 William had married his cousin, the Princess Mary (born 30th April 1662), elder daughter by Anne Hyde of the Duke of York, afterwards James II.—a political match, which did not at first prove a happy one. Until the birth of her half-brother on 10th June 1688 Mary was heir to the English crown; naturally William gave no countenance to Monmouth's expedition (1685), and as naturally that birth was a blow to William's ambition and to his hopes of stemming the renewed aggression of France, against which with consummate diplomacy he had in 1686 formed a great European league. But James's tyranny was estranging from him the affections of every class of his subjects; the eyes of all Englishmen were turning towards the Stadtholder as their only hope; and, on the day that the Seven Bishops were acquitted, seven Englishmen of high position, both Tories and Whigs, invited him to come over and redress their grievances. Having once formed his resolution, William conducted the operations with great secrecy and skill. On 5th November 1688 he landed at Torbay with an army of 15,000, composed of English and Dutch. His success was rapid and bloodless. Men of all parties came over to him; on 23d December James fled the kingdom; and, the throne having been declared vacant by the Convention Parliament, on 13th February 1689 William and Mary (she had landed the day before) were proclaimed king and queen of Great Britain and Ireland. The assembling of a free parliament had been, he professed, his sole object; but his acceptance of the warming-pan fiction, and his refusal to have any share in the government save as king in his own person and for the term of his life, sufficiently reveal his aims.

James's adherents held out for some time in Scotland and Ireland, but the fall of Dundee at Killiecrankie ended their resistance in the former country (July 1689), whilst in the latter their last stronghold, Limerick, had to surrender (October 1691). William thus was left free for his continental campaigns, in which, great soldier though he was, he found himself outmatched by Luxembourg. The latter's death in 1695 was a turning-point in the war, which yet was ended only by the peace of Ryswick (1697), a peace distasteful to William, but highly popular with his English subjects. In spite of his sterling qualities, and of the debt that they owed him, he and they were never in sympathy; his foreign birth, his reserve, his very ill-health were against him. The death by smallpox on 28th December 1694 of his wife, for whom, though not faithful to her, he sorrowed inconsolably, materially injured his position. His schemes were thwarted by parliament; continual plots for his assassination were hatched by James's adherents; and the death in 1700 of Charles II. of Spain, and the succession of Philip of Anjou, was another blow to his policy. He pursued it, however, with unflagging vigour till his death, which took place at Kensington on 8th March 1702. His horse (it had been Sir John Fenwick's) a fortnight before had stumbled over a molehill and thrown him: hence the Jacobite toast, 'To the little gentleman in black velvet.' During his reign the Bank of England was established, the modern system of finance introduced, ministerial responsibility recognised, the liberty of the press secured, and the British constitution established on a firm basis.

See the articles BANKING (p. 711), BOYNE, DARIEN SCHEME, ENGLAND (p. 353), FENWICK, GINCKELL, GLENCOE, HOLLAND (p. 743), JACOBITES, JAMES II., LA HOGUE, LONDONDERRY, LOUIS XIV., MARLBOROUGH, NEERWINDEN, NONJURORS, RIGHTS (DECLARATION OF), SCHOMBERG, SCOTLAND (p. 245), SENEFFE, STEINKERK, &c.; the Histories of Burnet and Macaulay; the autobiographical *Memoirs* of Queen Mary, edited by Dr Doebner (1885); and H. D. Traill's *William III.* ('Twelve English Statesmen' series, 1888).

William IV., the 'sailor-king,' was born at Buckingham Palace on 21st August 1765. The third son of George III., till 1771 he remained, along with the Prince of Wales and Prince Frederick, under the care of Dr Majendie, and then was sent to Kew, where, with Prince Edward, afterwards Duke of Kent, he was under the guardianship of Colonel Budé. He entered the navy as a midshipman in 1779, and, having seen some service off the coast of America and in the West Indies (he was the first English prince that visited the New World), in 1785 was promoted to lieutenant, and in 1786 to captain. In June 1789, having a year and a half before returned from Halifax to England without leave, he was created Duke of Clarence and St Andrews and Earl of Munster, with an allowance from parliament of £12,000 a

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year; but his professional career was at an end, although he was formally promoted through the successive ranks to that of Admiral of the Fleet (1801), and although during 1827–28 he held the revived office of Lord High Admiral. From 1790 to 1811 he lived with the actress Mrs Jordan (q.v., 1762–1816), who bore him five sons and five daughters; on 13th July 1818 he married Adelaide (1792–1849), eldest daughter of the Duke of Saxe-Meiningen. Of the two daughters born of this marriage in 1819 and 1820, one lived but a few hours, and the other only three months. By the Duke of York's death in 1827 the Duke of Clarence became heir-presumptive to the throne, to which he succeeded at the death of his eldest brother, George IV., on 26th June 1830. A steady Whig up to his accession, he then naturally turned Tory, and did much to obstruct the passing of the great Liberal measure of his reign, the first Reform Act (1832). The abolition of colonial slavery (1833), the reform of the poor-laws (1834), and the Municipal Reform Act (1835) were immediate results of that great constitutional change. The plain, bluff king, whose eccentricity it was at one time feared would end in insanity, died at Windsor, after a short illness, on 20th June 1837, and was succeeded by his niece, Queen Victoria.

See (besides the articles on his premiers, GREY, MELBOURNE, and PEEL, with works there cited) the Duke of Buckingham's *Courts and Cabinets of William IV. and Victoria* (2 vols. 1861); the *Greville Memoirs*; and Percy Fitzgerald's *Life and Times of William IV.* (2 vols. 1884).

William the Lyon, king of Scotland, was born in 1143, a grandson of David I., and brother of Malcolm IV., whom he succeeded in 1165. Whence he derived his designation is one of the mysteries of history. When heraldry long afterwards became a science, and was supposed to have been in use earlier than it really was, it was not unnaturally supposed that he was the first king who used, as a heraldic achievement, the lion, afterwards the chief feature in the arms of Scotland. His predecessors had long contested with the kings of England the sovereignty of Northumberland and other districts of what is now the north of England. Under Malcolm these claims were virtually abandoned, and the king of Scots received, as a sort of equivalent for them, the earldom of Huntingdon and other valuable estates, holding of the English crown. William had still, however, a hankering after the Northumbrian districts. He attended Henry of England in his continental wars, and is supposed, when doing so, to have pressed for a portion at least of the old disputed districts. In his disappointment he invaded them after the example of his ancestors. On the 13th July 1174 he fell, near Alnwick Castle, into the hands of an English party. For security he was conveyed to Normandy, and there he consented, as the price of his liberation, to perform that homage for his kingdom which the English kings so long in vain attempted to exact from the government of Scotland. How far the Scots community would have admitted that he had a right to bind them in such a condition may be doubted. The treaty of Falaise, however, as the transaction was termed, from the place where it was adjusted, was revoked in the year 1189 by Richard I. of England in consideration of a payment of 10,000 marks, which he wanted for his celebrated expedition to Palestine. William had several disputes with the church, but he was one of the early benefactors of the regular ecclesiastics, and founded in 1178 the great abbey of Arbroath, which he dedicated to Thomas Becket, slain eight years earlier. William died at Stirling in 1214.

William the Silent, Prince of Orange (1533–84), was the means of freeing the Netherlands from the Spanish yoke, and his biography is interwoven with the history of Holland (q.v., Vol. V. p. 742). See also the works cited at the end of that article; and, on William himself, Klose, *Wilhelm I. von Oranien* (Leip. 1864); Juste, *Guillaume la Taciturne* (Brussels, 1874); Barrett, *William the Silent* (Boston, 1883); Kolligs, *Wilhelm von Oranien* (Bonn, 1885); his correspondence, edited by Gachard (Brussels, 1847–66); and the accounts of his murder, by Frederiks (Hague, 1884).

William I., seventh king of Prussia and first German emperor, was the second son of Frederick-William III. and his queen Louisa, of Mecklenburg-Strelitz. He was born on the 22d of March 1797, in the palace at Berlin. Although he lived to a great age, he was very delicate in his childhood, and was reared with difficulty. At Christmas 1803 he donned the military uniform of the celebrated regiment now known as the Red Hussars. The prince's education was entrusted first to Privy-councillor Dellbrück and afterwards to Professor Reimann; and in the science of war he had the benefit of the tuition of Generals Von Scharnhorst and Von Knesebeck. His instructor in law was the celebrated international jurist De Savigny; and he took lessons in the plastic arts from Rauch, the sculptor, and Schenkel, Berlin's greatest architect. He formally entered the army in January 1807, and within a year got his first promotion. He received constant instruction in military tactics; and in 1814 the prince crossed the Rhine in the staff of his father, and on the 27th of February received his 'baptism of fire' on French territory, at Bar-sur-Aube. He behaved with such gallantry that the emperor of Russia conferred upon him the Cross of St George, while the king of Prussia awarded him the Iron Cross. As his military career began with the 1814 campaign against the first Napoleon, so was it destined to close with the campaign of 1870–71 against the third Napoleon. The prince entered Paris with the allies on the 31st of March 1814.

Prince William was made a privy-councillor in 1817, and in the following year, on attaining his majority, he was advanced to the rank of a major-general in the army. During the king's absence in Russia he was entrusted with the charge of the whole Prussian military department. In 1825 he went to St Petersburg, conveying the king of Prussia's congratulations to the Czar Nicholas on his accession. In June 1829 the prince was married to the Princess Augusta of Saxe-Weimar. By the accession of his brother, Frederick-William IV., in 1840, he became heir-presumptive, and assumed the customary title of Prince of Prussia. In 1844 he visited England, and formed a friendship with Queen Victoria and the Prince Consort, which was cemented by several subsequent visits. During the revolutionary events of 1848 the Prince of Prussia's attitude towards the people was severely criticised, and for a time he was very unpopular at Berlin. He was obliged to quit Prussia, and, proceeding to London, took up his quarters at the Prussian Legation. In two months, however, he received his recall. As deputy for the district of Wirsitz he defended his conduct and policy in the first National Assembly. In 1849 he subdued the disaffection in Baden. In 1855 he presided over the military commission which decided upon the adoption of the needle-gun throughout the Prussian army; and on the 1st of January ensuing he celebrated his fifty years of military service. In 1858 his son, Frederick-William (see FREDERICK III.), married the Princess Royal of England, and the same year the Prince of Prussia received and entertained Queen Victoria and Prince Albert on their visit to Germany. In consequence of the prolonged disable-

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ment through paralysis of the king of Prussia, the prince was formally appointed regent of the kingdom, October 7, 1858. He carried out searching army reforms, and took an active share in European diplomacy. On the 2d of January 1861 Frederick-William IV. expired at Sans Souci, and the Prince of Prussia succeeded to the throne as William I. Great hopes were entertained of a more liberal policy than was favoured by the deceased monarch, but King William soon manifested his intention of consolidating the throne and strengthening the army rather than launching forth upon a career associated with popular progress. A few months after his accession the king narrowly escaped assassination at the hands of a Leipzig student named Oscar Becker.

Determined to press forward his new scheme for increasing the army, and making its strength immediately available, the king discovered in Prince Bismarck (q.v.) an able instrument for effecting his purposes. Bismarck was placed at the head of the ministry, with Roon—the author of the new army system—as war minister. The scheme was very unpalatable to the parliament, but the minister-president forced it upon the nation, with the necessary increased expenditure, by overriding the constitution. In 1864 the Sleswick-Holstein difficulty led to a war with Denmark (q.v.), in which the Prussian and Austrian troops were victorious; and in 1866 the two allied powers quarrelled over the spoils, and struggled for the supremacy amongst the German states. Austria (q.v.) was crushed by the battle of Sadowa, which closed the Seven Weeks' War, and Prussia gained in territory and prestige by her victories. France, alarmed by the growing ascendency of Prussia in Europe, endeavoured to form a confederacy of the South-German states, but the project failed. The affair of the duchy of Luxemburg nearly led to a war between France and Prussia in 1867, but the difficulty was adjusted by the treaty of London, which declared the duchy to be a neutral state. Shortly afterwards King William and Prince Bismarck visited the Emperor Napoleon at Paris, the Great Exhibition furnishing the occasion for this peaceable *réunion*. In 1870, however, the inevitable struggle between France and Prussia was precipitated. The Spanish throne having become vacant, Prince Leopold, son of the Prince of Hohenzollern-Sigmaringen, was put forward as a candidate. The prince agreed to accept the Spanish crown if the Cortes chose him. As King William was the head of the House of Hohenzollern, this gave great umbrage to the war party in France, who bitterly denounced Bismarck as the promoter of Prince Leopold's candidature. Although the candidature was withdrawn, Napoleon III. still forced a quarrel on Prussia, by making impossible demands upon the king, and war was declared between the two countries. William took the field on July 31, and issued a proclamation affirming that a neighbouring state had declared war against Prussia without any cause. In the deadly struggle which ensued King William, who was then seventy-three years of age, acted as real commander-in-chief of the Prussian army. The French forces were defeated almost everywhere with great slaughter; Napoleon capitulated at Sedan; and by the end of September the city of Paris was invested. While William was at Versailles in December, the North-German parliament, together with the princes of Germany, pressed upon him the acceptance of the imperial crown of Germany, and on the 18th of January 1871 he was proclaimed as German emperor. Peace was signed on February 26—Germany receiving a large war indemnity and recovering Alsace and Lorraine; and on March 1 the German troops entered Paris.

Interviews between the German and Austrian emperors in August–September 1871 were supposed to indicate the formation of an Austro-German alliance, which was strengthened by the adhesion of the czar in 1873. The Emperor William visited Victor Emmanuel at Milan in 1874; and the peace of Europe was further assured by the strict neutrality of Germany during the Russo-Turkish war of 1876–77. During this period the emperor and Prince Bismarck were engaged in consolidating the fabric of Teutonic unity. For some years, nevertheless, there was great friction between the Vatican and the court of Berlin on the question of the imperial jurisdiction over German Catholic subjects; but on the accession of Pope Leo XIII. a more amicable spirit prevailed, and the dispute was finally closed in 1883 by concessions to the ultramontane party. The rapid rise of Socialism in Germany led to severe legislative measures, and in 1878 the emperor's life was twice attempted by adherents of the Socialist party—first by a mechanic named Max Hödel, and secondly by Dr Karl Nobiling. On the latter occasion the aged emperor was seriously wounded, but he recovered his health in a surprising manner.

The emperor celebrated his golden wedding June 11, 1879. On the 15th of October 1880 he was present at the opening of Cologne Cathedral, and on the 28th of September 1883 he unveiled the great national monument on the Niederwald, near Rudesheim. Here another attempt was made upon his life, which was followed by still more stringent measures against the Socialists. The ninetieth anniversary of the emperor's birth was celebrated with great rejoicings throughout Germany on the 22d of March 1887. The veteran monarch, however, did not long survive the celebration, as he died on the 9th of March 1888. William I., though holding tenaciously to the prerogatives of the kingly office, was of a simple and unassuming personal character. He was frank, open-hearted, generous, sincere, and pious; withal he had an inflexible will, and high moral and physical courage. Humane and magnanimous, he was yet a born ruler of men.

See Schmidt and Otto's *Kaiser Wilhelm und seine Zeit*; Lowe's *Prince Bismarck: a Historical Biography*; E. Simon, *The Emperor William and his Reign* (trans. from the French, 1886); the present writer's *William I. and the German Empire* (1887); A. Forbes, *Life of Emperor William* (1889); *Politische Korrespondenz Kaiser Wilhelms I.* (1890); S. Whitman's *Imperial Germany* (1891); and W. Oncken, *Das Zeitalter des Kaisers Wilhelm* (2 vols. 1892).

William II., third German emperor and ninth king of Prussia, was born at Berlin, 27th January 1859, the son of the Crown-prince Frederick and the Princess Victoria (Princess Royal) of England. After a careful home education, he studied at the gymnasium in Cassel, passing the leaving examination. He also underwent a systematic and very thorough military training, and was early drilled in administrative methods and governmental usages. In spite of an accident at his birth which permanently weakened his left arm, he became an admirable horseman and an indefatigable hunter. He is also an enthusiastic yachtsman. Called to the throne by the death of his father, Frederick III., in 1888 (when his mother, three months an empress, retired into private life), he showed in all departments of imperial government, in all that concerned foreign relations, in the management of army and navy, an irrepressible and exuberant energy. He startled Europe by speeches in which he indicated a very exalted notion of his imperial responsibility, and intimated his resolve to maintain the high monarchical traditions of the Hohenzollern house. He made a series of tours to foreign courts—St Petersburg,

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Stockholm, Copenhagen, Rome, and Athens—and repeatedly visited his grandmother at Windsor. His independent attitude led to strained relations with his mentor, Prince Bismarck, the all-powerful chancellor; and as Bismarck strongly disapproved concessions to what he regarded as dangerous state-socialism which the strong-willed emperor insisted on, Bismarck resigned (1890), and was succeeded by Count Caprivi, heretofore known only as a Prussian general. Events and tendencies of the new regime have been the strengthening of the triple alliance between Germany, Austria, and Italy; the weakening of the old bond between Germany and Russia; the cession to Germany of Heligoland (1890) in return for a rectification, to the advantage of Britain, of the frontiers between the German and English spheres of influence in Africa; and legislation designed to improve the position of the working man. A favourite scheme of the emperor's, a religious education bill, had to be withdrawn in deference to the opposition it evoked as being a reactionary measure. By his marriage (1881) with a princess of Sleswick-Holstein (of the elder branch of the House of Oldenburg) he had six sons and, in 1892, a daughter. See H. Frederic, *The Young Emperor William II.* (1891).

William and Mary College, next to Harvard College the oldest institution of learning in America, was established at Williamsburg, Virginia, in 1693, to train students for the Episcopal ministry. It was endowed with lands, and placed under the patronage of the king and queen of Great Britain. Its chancellors in colonial times were the bishops of London, its presidents their representatives; and it became the wealthiest college of America. At the Revolution, however, it lost most of its possessions, half the students entered the army, and the French troops occupied its buildings as a hospital. Here were educated Jefferson, Madison, and Monroe, and General Scott. Its students now hardly exceed a score.

William of Malmesbury. See MALMESBURY. For William of Champeaux, see SCHOLASTICISM.

William of Newbury, chronicler, one of the chief authorities for the reign of Henry II., was a native of Bridlington in Yorkshire, and lived from 1135 to 1200. His *Historia Rerum Anglicarum* is divided into five books, extending from the year 1066 to 1198. It is clear, sound, and unprejudiced, the characters drawn with discrimination, and the narrative is especially valuable as an authority on the struggle between Becket and the king. It was edited for the English Historical Society by Mr Hans Hamilton (2 vols. 1856).

William of Tyre, historian, was probably born about 1137, but at any rate was appointed archdeacon of Tyre in 1167, and archbishop of Tyre in 1175. He was tutor to Baldwin, son of king Amalric, and was one of the six bishops who represented the Latin Church of the East at the Lateran Council (1179), and on the return journey spent some months with the Emperor Manuel at Constantinople. His history breaks off abruptly about the end of 1183. William of Tyre's *Historia Rerum in Partibus Transmarinis Gestarum* worthily fills up the space between the periods treated by Fulcher of Chartres and Ernoul, that is from 1127 to 1184. There is a 13th-century French translation, edited by P. Paris (2 vols. 1879–80), often styled *Roman d'Eracle*, simply because the name of Heraclius occurs in the first sentence. Another work was the *Historia de Orientalibus Principibus*, undertaken at the request of Amalric. As a historian William of Tyre is painstaking, learned, unprejudiced, with the gift moreover of graphic delineation.

William of Wykeham. See WYKEHAM.

Williams, ISAAC, Tractarian, was born on 12th December 1802 at Cwmcynfelin near Aberystwith, his maternal grandfather's home, and was brought up in London, his father being a Chancery barrister. He was educated at Worpleston near Guildford, at Harrow, and at Trinity College, Oxford; in 1822 made the acquaintance of Keble, and through him of Hurrell Froude; and in 1829 was ordained to the Oxfordshire curacy of Windrush. Elected in 1831 a fellow of his college, he was subsequently curate to Newman, and at Bisley; in 1842 stood unsuccessfully for the Oxford chair of Poetry; and for seventeen years lived at Stinchcombe, Gloucestershire, where he died, 1st May 1865. His works, nearly thirty in number, were chiefly religious poetry; but the most noteworthy was Tract 80, on 'Reserve in Religious Teaching.' See his *Autobiography* (1892).

Williams, JOHN, missionary martyr, was born at Tottenham, near London, 29th June 1796. At fourteen he was apprenticed to an ironmonger, but having offered himself to the London Missionary Society, was sent in 1816 to Eimeo, one of the Society Islands. Later he settled in Raiatea, the largest of the group, and laboured here with marvellous success, his powers of organisation being as conspicuous as his zeal. In 1823 he went to Raratonga, the chief of the Hervey Islands, and ere long the whole group was Christianised. He next built a boat 60 feet long, and 18 wide, the sails of native matting, the cordage of the bark of the hibiscus, the oakum of cocoa-nut husks and banana stumps, and in this vessel during the next four years he visited many of the South Sea Islands, extending his missionary labours to the Samoa Islands. In 1834 he returned to England, and remained nearly four years, superintending the printing by the Bible Society of his Raratongan New Testament, and raising £4000 to equip a missionary-ship for Polynesia. In 1838 he went out again, visited many of the stations he had already established, and sailed as far west as the New Hebrides, where he hoped to plant a mission, but was killed and eaten by the savage natives of Erromango, November 20, 1839. He published his *Narrative of Missionary Enterprises* in 1837. See the Memoir by Rev. Ebenezer Prout (1843).

Williams, SIR MONIER MONIER-, Sanskrit scholar, was born at Bombay, 12th November 1819, and educated at King's College, London, and Balliol and University Colleges, Oxford, taking the Boden scholarship in 1843, and graduating B.A. in 1844. He was professor of Sanskrit at Haileybury (1844–58), and a master at Cheltenham (1858–60), when he was appointed Boden professor of Sanskrit at Oxford. He was knighted in 1886, at the opening of the Indian Institute established mainly through his energy.

His books include Sanskrit grammars (1846 and 1860), English-Sanskrit (1851) and Sanskrit-English dictionaries (1872), an edition of the *Sákuntalá* (1853), and other Sanskrit texts, *Rudiments of Hindustani* (1858), *Indian Epic Poetry* (1863), *Indian Wisdom* (1875), *Hinduism* (1877), *Modern India and the Indians* (1878), *Religious Thought and Life in India* (1883), *The Holy Bible and the Sacred Books of the East* (1887), and *Buddhism in its connection with Brahminism and Hinduism, and in its Contrast with Christianity*—the Duff Lectures (1889).

Williams, ROGER, founder of the state of Rhode Island, and one of the apostles of Toleration, was born about 1600, somewhere in Wales. In his youth he went up to London and attracted the attention of Sir Edward Coke by his shorthand notes of sermons and of speeches in the Star-chamber, and was sent by him in 1621 to Sutton's Hospital (now the Charterhouse School). It is most probable that thereafter he studied at

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Pembroke College, Cambridge; and he was afterwards admitted to orders in the Church of England, but soon became an extreme Puritan, and emigrated to New England, arriving at Boston in February 1631. He refused to join the congregation at Boston, because the people would not make public declaration of their repentance for having been in communion with the Church of England; he therefore went to Salem, as assistant-preacher, but was soon in trouble for denying the right of magistrates to punish Sabbath-breaking and other religious offences, as belonging to the first table of the Law. For his opposition to the New England theocracy he was driven from Salem, and took refuge at Plymouth, where he studied Indian dialects. Two years later he returned to Salem, only to meet renewed persecution and banishment from the colony, for denying the right to take the Indians' lands without purchase, and the right to impose faith and worship. He held that it was not lawful to require a wicked person to swear or pray, which were both forms of worship; and that the power of the civil magistrate extends only to the bodies, goods, and outward state of men, and not to their souls and consciences. Banished from the colony in 1635, and threatened with deportation to England in order to prevent the infection of his pernicious doctrine of toleration from spreading, he escaped in midwinter to the shores of Narragansett Bay, accompanied by a few adherents, where he purchased lands of the Indian chiefs, founded the city of Providence (June 1636), and established a government of pure democracy. Having adopted the belief in adult baptism of believers by immersion, Williams was baptised (1639) by a layman, and then baptised him and ten others, thus founding the first Baptist church in America. Later he doubted the validity of this baptism, and withdrew from the church he had founded. In 1643 he came to England to procure a charter for his colony, and published a *Key into the Language of America* (1643), and *The Bloudy Tenent of Persecution for Cause of Conscience Discussed* (1644), in which the right to religious freedom is argued in a dialogue between Truth and Peace. The chief attempt at an answer he replied to later with *The Bloudy Tenent yet more bloudy by Mr Cotton's Endeavour to wash it White in the Blood of the Lamb* (1652). After going back to Rhode Island, he returned a second time to England on business of the colony in 1651, when he published *Experiments of Spiritual Life and Health, and their Preservations*, dedicated to Lady Vane, and *The Hireling Ministry none of Christ's*. At this period he engaged in an experiment of teaching languages by conversation, and made the acquaintance of Milton, who speaks of him as 'that noble confessor of religious liberty.' He returned to Rhode Island in 1654, and was president of the colony from that year till 1658. He refused to persecute the Quakers, but engaged in 1672 in a famous controversy with them—recorded in *George Fox digged out of his Burrowes* (Boston, 1676). He died in 1683.

See Memoirs by James D. Knowles (Boston, 1834), William Gammell (Boston, 1845), Romeo Elton (Lond. 1853), Reuben A. Guild (Providence, 1866), H. M. Dexter (Boston, 1876). His Letters were edited by J. Russell Bartlett (Providence, 1882); his Works by the Narragansett Club (6 vols. 4to, Providence, 1866–74).

Williams, ROWLAND, Liberal divine, was born at Halkyn in Flintshire, August 16, 1817, and had his education at Eton and King's College, Cambridge. He became fellow, and later tutor, of his college, and in 1850 was appointed vice-principal and professor of Hebrew at Lampeter College. In 1859 he was presented to the vicarage of Broad-Chalke near Salisbury, and hither he retired in 1862 after the storm caused by his contribution, 'Bunsen's Biblical Researches,' to *Essays and Reviews*. He was tried by the Canterbury Court of Arches, and sentenced to suspension for one year, but the Privy-council reversed the judgment. He died January 18, 1870.

His chief books are *Christianity and Hinduism* (1856); *Rational Godliness* (1855); *Broad-Chalke Sermon-Essays* (1867); *The Hebrew Prophets*, translated afresh (2 vols. 1868–71); *Psalms and Litanies* (1872). See the Life by his widow (2 vols. 1874).

Williamsburg, the oldest incorporated town of Virginia, and capital of James City county, lies near the James River, 48 miles by rail ESE. of Richmond. Here are William and Mary College (q.v.) and the Eastern State Lunatic Asylum. Founded in 1632, it was the colonial and state capital till 1779. The town was taken by McClellan after severe fighting on May 5–6, 1862. Pop. 1500.

Williams College, a Congregational college of 200 students at Williamstown, Massachusetts, was founded as a free school by a bequest of Colonel Ephraim Williams in 1755, and incorporated in 1793. In 1838 it was provided with the first public astronomical observatory erected in America (see *Nature*, vol. xxxix. p. 137). This, the Hopkins Observatory, has since been superseded for scientific work by another.

Williamson, ALEXANDER WILLIAM, chemist, was born in London, May 1, 1824, studied at home, at Paris, and at Giessen, and in 1849 became professor of Practical Chemistry at University College, London, as also in 1855 of Chemistry; he resigned in 1887. He has been president of the Chemical Society and of the British Association; is a corresponding member of the French and other foreign academies; is F.R.S. and LL.D.; and has received numerous medals and distinctions for his researches on etherification, gas analysis, the atomic theory, &c. He has published many papers and lectures, and a well-known *Chemistry for Students*.

Williamsport, capital of Lycoming county, Pennsylvania, on the west bank of the Susquehanna (here crossed by a suspension bridge), 93 miles by rail N. of Harrisburg. It lies in the midst of attractive scenery, and is a popular summer-resort, but is chiefly notable as one of the great lumber marts of the Union. The boom here cost a million dollars, and can hold 300,000,000 feet of lumber. Pop. (1880) 18,934; (1890) 27,132.

Willibrod, or WILBRORD, the apostle of the Frisians, was born in Northumbria about 658, became a Benedictine and scholar of Egbert, and was sent about 690 as missionary to Friesland. He went first to Rome to get the papal benediction, was made Bishop of Utrecht, and laboured with the utmost zeal and success till his death in the abbey of Echternach, 7th November 739. See his Life by Alberdingk Thijm (Münster, 1863); and Ebrard, *Die Iro-Schottische Missionskirche* (1873).

Willimantic, a borough of Connecticut, 31 miles by rail E. by S. of Hartford, with large cotton, silk, woollen, and tin factories, &c., dependent on the power supplied by the Willimantic River, which here falls 100 feet in 1 mile. Pop. 8648.

Willis, NATHANIEL PARKER, American author, was born at Portland, Maine, January 20, 1806. He came of a race of printers and publishers; his father founded the *Youth's Companion* (1827), which is still issued. Educated at Yale, on the completion of his college course, and after issuing several volumes of poetry, he established the *American Monthly Magazine*, afterwards merged in the *New York Mirror*, in which he was associated with George P. Morris. In 1831 he visited Europe, and contributed to the *Mirror* his *Pencillings by the Way*. Appointed *attaché* to the American legation at Paris, he had favourable

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opportunities for observing European society, and after a visit to Greece and Turkey returned to England in 1837, and married a daughter of a British officer, General Stace. He contributed to the London *New Monthly* his *Inklings of Adventure* (republished 1836), and returned to New York and published *Letters from under a Bridge* (1840). In 1844 he engaged with General Morris in editing the *Daily Mirror*, his wife died, and he revisited Europe, and published *Dashes at Life with a Free Pencil* (1845); returned to New York in 1846, he married a daughter of the Hon. Joseph Grinnell of New Bedford, and with his former partner established the *Home Journal*, to which he contributed most of the following works, also published in a collected form: in 1850, *People I have Met* and *Life Here and There;* 1851, *Hurrygraphs, Memoranda of a Life of Jenny Lind;* 1853, *Fun Jottings, A Summer Cruise in the Mediterranean;* 1854, *A Health-trip to the Tropics, Famous Persons and Places, Outdoors at Idlewild;* 1855, *The Rag-bag;* 1857, *Paul Fane;* 1859, *The Convalescent.* Thackeray contributed to his paper the *Mirror.* Much of this work was done during a long, brave struggle with what appeared to be consumptive disease. Mr Willis was an observant and thoughtful writer, discursive, fragmentary, picturesque, sprightly, quaint, and graceful, full of elaborate ease and ingenious spontaneity. He died at Idlewild, near Cornwall-on-the-Hudson, January 20, 1867. See Life in 'American Men of Letters' series (1885), by H. A. Beers, who also edited *Selections* from his prose-writings (1885).—His sister, SARA PAYSON WILLIS (1811–72), was a popular writer under the pen-name of 'Fanny Fern.' See *Fanny Fern, a Memorial Volume* (1873), by her husband, James Parton, an industrious journalist and compiler (born 1822).

Willis, THOMAS, physician (1621–73), studied at Christ Church, Oxford, was for a time Sedleian professor of Natural Philosophy, but became famous as a physician in Westminster. He wrote on the plague; see MEDICINE, Vol. VII. p. 118.

Willis's Rooms (closed 1890). See ALMACK'S.

Will-o'-the-Wisp. See IGNIS FATUUS.

Willoughby, SIR HUGH, explorer, probably a native of Risby in Derbyshire, of whom little is certain save his unfortunate fate. In 1553 an expedition was fitted out at an expense of £6000 by the merchants of London 'for the discovery of regions, dominions, islands, and places unknown,' and Willoughby was appointed its commander 'both by reason of his goodly personage (for he was of tall stature) and his singular skill in the services of war.' On the 10th of May he sailed from Deptford with three vessels, the *Bona Esperanza* of 120 tons, his own ship, carrying thirty-five persons; the *Edward Bonaventure*, 160 tons burden, commanded by Richard Chancellor, and carrying fifty men; and the *Bona Confidentia* of 90 tons, under command of Cornelius Durfoorth, with twenty-eight men. After sailing along the east coast of England and Scotland, they crossed the North Sea in company, and sighted the coast of Norway about the middle of July. In the middle of September the *Edward Bonaventure*, at Senjen during a storm, parted company with the two other vessels, which were tossed about until they reached the coast of Russian Lapland, where they found a good harbour at the mouth of the river Arzina, in which Sir Hugh determined to pass the winter. Here Willoughby and his sixty-two companions all perished during the course of the winter, doubtless of scurvy. The following year Russian fishermen found the ships with the dead bodies of the crews, together with the commander's journal and a will witnessed by Willoughby, showing that some of the mariners were alive in the January of 1554. Chancellor, after being separated from his comrades, sailed with the third vessel to Vardoehus, where he waited seven days for Willoughby, set out again, and finally reached the mouth of the river Dwina in the White Sea. Here he was well received by the natives, and news of his arrival immediately despatched to the Czar Ivan Vasilievitch, who invited the mariners to the court of Moscow, where they spent a part of the winter, returning in the following summer to England.

Willow (*Salix*), a genus of trees and shrubs of the natural order Salicaceæ, otherwise regarded as a sub-order of Amentaceæ. This order or sub-order, to which the Poplar (q.v.) also belongs, is distinguished by having the flowers naked or with a cup-like perianth; numerous ovules; a naked, leathery, one-celled, two-valved fruit; seeds with long hairs; leaves with stipules. In the willows the flowers are absolutely naked, the stamens from one to five in number, the leaves simple and deciduous. There are many species and very numerous varieties. So widely do British botanists differ as to the number of species indigenous to Britain that Bentham recognises only fifteen, while Babington places them at fifty-eight. They are mostly natives of the colder temperate regions of the northern hemisphere, although some are found in warm countries, as *Salix tetrasperma* in the hottest parts of India, and another species abundantly on the banks of the Senegal. Most of them are shrubs, and some are of very humble growth, particularly those of arctic and alpine regions. Thus, *S. herbacea*, which occurs on the mountains of Scotland, seldom rises more than an inch from the ground. *S. arctica* and *S. polaris* are the most northern woody plants. Other small species are also found to the very limits of perpetual snow in different countries, as *S. lindleyana* on the Himalaya. Some of those which more generally receive the popular name willow are trees of large size and remarkably rapid growth. The

White Willow (*Salix alba*):
a, branchlet of male tree with flowers; *b*, do. female tree (Bentley and Trimen).

White Willow, or Huntingdon Willow, is by far the largest species known in Britain. It attains a height of 80 feet, and grows so rapidly that a cutting has been known to become a tree of

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30 feet in ten years. Its head is much branched and spreading, its leaves narrow elliptical-lanceolate, silky beneath, and sometimes also above. The wood of some willows is used for many purposes, being remarkably tough and durable, although light and soft. It was anciently used for shields, and for building sloops of war. Cork-cutters and others employ it for whetting sharp-edged implements, and it is largely used in the manufacture of cricket-bats and for making paddles of steamboats. The leaves and young shoots are in some places used as fodder, and even dried and stacked; and in times of scarcity the bark has been kiln-dried and ground, to mix with meal. Willows are often planted as ornamental trees, especially near streams and in moist grounds. Many kinds are also planted on the banks of rivers, to retain the soil in its place, and restrain the encroachments of the river. They are the better adapted for this purpose that they grow readily by cuttings; and willow-stakes driven into a moist soil strike root, and soon become luxuriant. The twigs of most of the willows are very tough and flexible, and are used by coopers for making hoops, and by gardeners for tying espalier trees, and for many similar purposes. They are much used for basket-making and other kinds of wickerwork (see OSIER); willow withes were probably amongst the first ropes used by man. But the young shoots of many of the kinds with ovate or little elongated leaves are comparatively brittle and ill adapted for wickerwork.

Common Sallow (*Salix cinerea*).

Of this kind are the Sallows, trees or low shrubs with downy branches, generally ovate or obovate wrinkled leaves, having stipules. The Gray or Common Sallow (*S. cinerea*) makes good copsewood and excellent charcoal for gunpowder. Other common species are the Round-eared (*S. aurita*) and Great Round-eared (*S. caprea*) Sallows, the latter growing in a drier soil than the others, and becoming a small tree. The Long-leaved Sallow (*S. acuminata*) has lanceolate leaves. Willow-trees are sometimes treated as pollards, and the lop used for fuel and other purposes. They are also often grown as coppice-wood, yielding a great bulk of hoops, poles, fuel, &c. The Crack Willow (*S. fragilis*), the Goat Willow (*S. caprea*), and others with brittle stems and branches, which are unsuitable for basket-making, are often planted to furnish wood for charcoal for the manufacture of gunpowder, for which purpose it is greatly esteemed. A valuable medicinal principle called *Salicin* (q.v.) exists in the bark of willows; it is more abundant in the Bedford Willow (*S. russelliana*) than in any other species. This species is also remarkable in containing a larger proportion of tannin in its bark than even the oak itself. *S. pentandra*, a British species, besides being tonic is also possessed of aromatic properties. The flowers of the willow, which in many species appear before the leaves, are much sought after by bees. The male catkins (see figure at CATKIN) of many species are very beautiful, the prominent anthers being of a fine yellow colour, or, as in *S. purpurea*, of a rich purple. The sweet-scented male catkins of *S. ægyptiaca* are used in the preparation of a stimulant and carminative liquid much favoured in some parts of the East. The Weeping Willow (*S. babylonica*) is a very ornamental species, a native of the East, now much planted in Britain and on the continent of Europe, on account of its beautiful pendent twigs. Perhaps the most complete collection of willows in cultivation in Britain is that at Woburn, the seat of the Duke of Bedford.

Willow Moth (*Caradrina quadripunctata*), a common British night moth, whose caterpillar is very destructive to stored grain.

Wills, WILLIAM GORMAN, play-writer, was born in Kilkenny county in 1828, studied at Trinity College, Dublin, and was pupil in the art school of the Royal Irish Academy. He became known as a playwright when *The Man o' Airlie* appeared (1866), and followed this up by a series of plays amongst which are *Charles I.* (1872), *Jane Shore* (1876), *Olivia*, *Nell Gwynne*, *Sedgemoor*, and *Claudian* (1885). He has also painted portraits, and written some novels.

Willughby, FRANCIS, ornithologist, the son of Sir Francis Willughby, was born in 1635, and studied at Cambridge, where he became the pupil of the famous naturalist John Ray. He spent some time at Oxford, and then started on the memorable continental tour (1663–64) with Ray (q.v.), making studies and collecting zoological specimens. He died 3d July 1672 from the effects of over-study and hardship on a naturally weak frame. Ray edited and translated his *Ornithologia* (1676–78) and edited his *Historia Piscium* (1686). To the former Buffon and Linnæus were much indebted.

Wilmington, (1) the only large city and a port of Delaware, on the Delaware River and Brandywine and Christiana Creeks, 25 miles by rail SW. of Philadelphia. It is a handsome, regular town, built on the slopes of a hill (240 feet), and contains a granite custom-house, town-hall, large opera-house, the Wilmington Institute, the Old Swedes' Church (1698), &c. Its numerous manufactures include iron steamships, railway cars, engines, machinery, cottons, woollens, powder, leather, flour, matches, &c. Pop. (1880) 42,478; (1890) 61,431.—(2) The largest city and a port of North Carolina, capital of New Hanover county, on the left bank of Cape Fear River, 30 miles from its mouth and 207 miles by rail SSE. of Raleigh. It manufactures turpentine, rice, flour, and cottons, and exports lumber, tar, rosin, turpentine, &c. During the civil war it was one of the chief ports of the Confederacy, and was frequented by blockade-runners. Pop. (1880) 17,350; (1890) 20,056.

Wilmot. See ROCHESTER (EARL OF).

Wilmot Proviso, an amendment to a bill to appropriate $2,000,000 for the purchase of Mexican territory, moved in the United States congress in 1846 by Mr David Wilmot, to the effect 'that neither slavery nor involuntary servitude shall ever exist in any part of said territory.' The proviso passed the house, but was rejected by the senate, the Freesoil movement being the result (see FREESOILERS).

Wilna. See VILNO.

Wilson, ALEXANDER, American ornithologist, was born at Paisley, Scotland, July 6, 1766. He was the son of a weaver, and, though at first intended for the church, he was apprenticed in 1779 to the weaving-trade. Meanwhile he indulged his

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fondness for writing verses, for books and nature. He gratified a roving disposition by mounting a pedlar's pack for about three years, and published a volume of poems in 1790. The piece by which he is best remembered is a droll poem in the Scottish dialect, styled *Watty and Meg*, published as a chap-book in 1792, and ascribed by some to Burns, whose acquaintance he made. He was prosecuted for a lampoon upon a resident of Paisley, and afterwards sailed from Belfast for America, and landed at Newcastle, Delaware, July 14, 1794, with a few borrowed shillings in his pocket, and no acquaintances. He got work with a copperplate-printer in Philadelphia, then with a weaver; travelled as a pedlar in New Jersey, where the brilliant plumage of the birds attracted his attention; was engaged as a school-teacher in Pennsylvania, and then walked 800 miles to visit a nephew in New York. Whilst he was teaching a school once more near Philadelphia, William Bertram, who was well acquainted with birds, stimulated and encouraged him in his studies of nature, and Alexander Lawson gave him lessons in drawing, colouring, and etching. His excellence at drawing birds strengthened his resolution to make a collection of all the birds that were to be found in America. In October 1804 he set out on his first excursion, in which he travelled to Niagara Falls, and wrote *The Foresters, a Poem*, and ere his return had walked 1260 miles. In 1806 he was employed on the American edition of *Rees's Cyclopædia*. He soon prevailed upon the publisher, Bradford, to undertake an American Ornithology, and in September 1808 he brought out the first volume, but in a style too costly for the tastes and fortunes of the period. The second volume was brought out in 1810. In 1811 he made a canoe voyage down the Ohio for 720 miles, and travelled overland through the Lower Mississippi Valley, from Nashville to New Orleans, collecting specimens for his third volume. His seventh volume appeared in 1813. In his eager pursuit of a rare species of bird, of which he had long wanted a specimen, he swam across a river, and caught a cold, which ended in his death, at Philadelphia, August 23, 1813, when he had nearly completed his work. The eighth and ninth volumes were published after his death, with memoir by Ord, his assistant. The work was continued by Charles Lucien Bonaparte, in 4 vols. (1828–33); and an edition by Sir W. Jardine (3 vols. 1832) has been more than once reprinted. Wilson was the first to study American birds in their native haunts, and his unrivalled descriptions are remarkable for fidelity and truth. A monument was erected to his memory in Paisley Abbey churchyard in 1874.

There are Lives by Crichton (1816), Ord (1828), Sir William Jardine (1829), Hetherington (1831), Jared Sparks (1851), Brightwell (1861), and A. P. Paton (1863), and a Sketch prefixed to Grosart's *Poems and Miscellaneous Prose* (2 vols. 1876).

Wilson, ANDREW, a son of the Indian missionary, John Wilson (q.v.).

Wilson, SIR DANIEL, LL.D., archæologist, was born in Edinburgh, the son of a wine-merchant, 5th January 1816. He was educated at the High School and university, and was early attracted to antiquarian studies. He had been for some time secretary to the Scottish Society of Antiquaries when in 1853 he was appointed professor of History and English Literature in the university of Toronto. He greatly promoted the prosperity of the university, and in 1881 became its president. In 1890 its valuable library was destroyed by fire, but in about a year he had collected a richer library than before. He was knighted in 1888; in 1891 received the freedom of Edinburgh; and died 8th August 1892. Amongst his works are *Memorials of Edinburgh in the Olden Time* (1847; new ed. 1892), which is a model local history; *Oliver Cromwell* (1843); *Archæology and Prehistoric Annals of Scotland* (1851; 2d ed. 1863), with about 200 illustrations drawn by himself; *Prehistoric Man* (2 vols. 1862; enlarged and rewritten 3d ed. 1876); *Chatterton* (1869); *Caliban: the Missing Link* (1873); poems entitled *Spring Wild Flowers* (1875); *Reminiscences of Old Edinburgh* (1878); *Anthropology* (1885); *William Nelson*, a Memoir (privately printed, 1890); *Left-handedness* (1891); *The Lost Atlantis* (posthumous, 1892). He edited for four years the Journal of the Canadian Institute, and was its president 1859–60.

Wilson, SIR ERASMUS (1809–84), dermatologist, Egyptologist, and philanthropist, studied at Aberdeen and London, became known as a skilful operator and dissector at the College of Surgeons in London, but was best known as a specialist on skin diseases. He published an *Anatomist's Vademecum*, a student's *Book of Diseases of the Skin*, a *Report on Leprosy*, and, in a very different field, *Egypt of the Past*. The great wealth he acquired by his practice he bestowed largely in benefactions to the poor and to science, founding a chair of dermatology at the College of Surgeons and of pathology at Aberdeen, building new wings to hospitals, and promoting Egyptian research. He it was who brought, at a cost of £10,000, Cleopatra's Needle to England. He was F.R.S., LL.D., president of the College of Surgeons in 1881, and was knighted in the same year.

Wilson, FLORENCE. See VOLUSENUS.

Wilson, GEORGE, M.D., chemist, was born at Edinburgh, a younger brother of Sir Daniel Wilson, 21st February 1818. He attended the High School and university, was licensed as lecturer on chemistry in the Edinburgh College of Surgeons, afterwards became a popular lecturer on chemistry in the School of Arts and in the Veterinary College, and in 1855 was appointed professor of Technology in Edinburgh University. In conjunction with this office he was Regius Director of the Industrial Museum of Scotland, an institution which owes much of its completeness and order to his knowledge and skill. He died 22d November 1859. 'His great quality,' says Dr John Brown, 'lay in making men love ascertained and recorded truth, scientific truth especially; he made his reader and hearer *enjoy facts*. He illuminated the book of nature as the monks did the missals of old.'

Amongst his scientific works were *Text-book of Chemistry* (1850), in Chambers's Educational Course; *Researches in Colour-blindness* (1855); and *The Five Gateways of Knowledge* (1856), a delightful hymn or prose-poem of science. Other works were the *Life of Cavendish* (1851); the *Life of Dr John Reid* (1852); and (along with Geikie) the *Memoir of Edward Forbes* (1861). A volume of his letters on religious subjects, with preface by Dr Cairns, was published as *Counsels of an Invalid* (1862), and a volume of essays, *Religio Chemici* (1862). There is a *Memoir* by his sister (new ed. 1862).

Wilson, HENRY, vice-president of the United States, was born the son of a farm-labourer at Farmington, New Hampshire, in 1812, and himself worked for eleven years on a farm. Born Jeremiah Jones Colbaith, he got rid of the name when he came of age, worked for a time as a shoemaker at Natick, Massachusetts, became prominent as an Abolitionist in the '30's, addressed sixty meetings for Harrison in 1840, and was elected to the Massachusetts legislature and state senate. He was an active leader of the Freesoilers (q.v.), assisted to form the new Republican party, and in 1855 entered the United States senate. There he sat for

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eighteen years, only leaving its floor to assume its presidency as vice-president of the United States in 1873. During the civil war he had been chairman of the important committee on military affairs, and had rendered great services in the matter of organising the army and raising and equipping troops. But in 1873 he had a stroke of paralysis, and died on 22d November of that year. Of his many writings the chief is his *History of the Rise and Fall of the Slave Power in America*, completed by another hand (3 vols. 1872–75). See the Life by T. Russell and the Rev. E. Nason (1872).

Wilson, HORACE HAYMAN, Sanskrit scholar, was born in London, 26th September 1786. He studied medicine, and in 1808 went to India as assistant-surgeon on the Bengal establishment of the E.I.C. His knowledge of chemistry led to his being employed in the Calcutta mint as assistant to Leyden; his mastery of Sanskrit, to his appointment on the recommendation of Colebrooke as secretary of the Asiatic Society of Bengal. In 1833 he became Boden professor of Sanskrit in Oxford, and soon after was appointed librarian at the East India House. These appointments he held till his death, 8th May 1860.

His first work was a verse translation of Kálidása's *Meghadúta*, or *Cloud Messenger* (1813). Next followed a Sanskrit-English *Dictionary* (1819); *Specimens of the Theatre of the Hindus* (3 vols. 1827); translations of the *Raghu Vansa* (1832); the *Vishn'u-Purân'a* (1840); *Rig-Veda-Sanhita Sanskrit Grammar* (1841); *Ariana Antiqua, the Antiquities and Coins of Afghanistan* (1841); *History of British India from 1805 to 1835* (1848); *Rig-Veda-Sanhita* (1850); and *Glossary of Judicial and Revenue Terms, from the Arabic, Persian, Hindustani, &c.* (1855). His collected works have been edited by R. Rost and F. Hall (13 vols. 1861–67).

Wilson, JAMES, economist (1805–60), was born at Hawick, settled in business in London, and became known as an author of books on the Corn Laws and the currency. He founded the *Economist* newspaper, entered parliament as a Liberal in 1847, and held successively the offices of Financial Secretary to the Treasury, Vice-president of the Board of Trade, and member of the Council of India.

Wilson, JOHN, 'Christopher North,' was born at Paisley on 18th May 1785. He was the eldest son, but fourth child, in a family of ten—his father a rich, self-made manufacturer of gauze, his mother, Margaret Sym (1753–1825), a descendant of the great Marquis of Montrose. His earlier education he received at the manse of Mearns, a wild moorland parish of Renfrewshire, till in 1797, shortly after the death of his father, who left him a fortune of £50,000, he was sent to the university of Glasgow. Here he carried off many prizes, wrote essays and verses, and fell in love with one 'Margaret.' In 1803 he went up to Magdalen College, Oxford, as a gentleman-commoner, and soon became notable alike for the splendour of his intellectual gifts and for his supremacy in the various athletic sports—boxing, rowing, running, riding, swimming, &c. A six-foot Apollo, he leapt the Cherwell (23 feet wide), and walked back from London in a single night; withal he was a patron of the cockpit and a winner of the Newdigate (1806) by his prize poem on 'The Study of Greek and Roman Architecture.' Having taken a 'glorious' B.A., and broken off his 'unfortunate attachment,' in 1807 he settled in Westmorland, attracted partly by the beauty of the Lake Country and partly by a desire to cultivate the intimacy of Wordsworth, of whose genius he was already a devout admirer. He purchased the charming little property of Elleray, overlooking Windermere; associated not only with Wordsworth, but with Southey, Coleridge, De Quincey, and the rest; kept a whole fleet of boats on the lake; and would match himself sometimes against the Cumberland wrestlers, one of whom has left it on record that he was 'a vera bad un to lick.'

In May 1811 he married Miss Jane Penny, a Liverpool lady, and now seriously devoted himself to poetry, in 1812 publishing his *Isle of Palms* (written five years earlier), and in 1816 *The City of the Plague*. Both had a fair success; but in 1815 the loss of his whole patrimony through an uncle's unjust stewardship obliged him to give up Elleray and settle with his mother in Edinburgh. He was called to the Scottish bar, but 'knew not what the devil to do' with the few briefs that came to him, so on the starting in 1817 of *Blackwood's Magazine* he proffered his services. They were readily accepted; and it is not too much to say that Wilson and his friend Lockhart (q.v.) were during its earlier years the soul of 'Maga's' success. Lockhart was withdrawn in 1826 to London; and Wilson, though never strictly its editor, became in the eye of the public more and more identified with the magazine; in a certain modified, yet very real sense, for many years he *was* editor. Meanwhile in 1819 he found himself in a position once more to set up house for himself, and in 1820 was elected over Sir William Hamilton to the Edinburgh chair of Moral Philosophy. The contest turned upon politics, and he as a Tory found favour with the town-council; still, though to begin with he knew little or nothing of his subject, and though even as a professor he would sometimes indulge in a 'mill,' he played a more than creditable part, and showed a wonderful power of stimulating the enthusiasm of his students. In 1837 he suffered an irreparable loss in the death of his wife; in 1840 he had a first slight shock of paralysis. He received a pension of £300 a year in 1851, and died on the midnight of 2–3d April 1854 at 8 Gloucester Place, Edinburgh, his home since 1826. He was buried in the Dean Cemetery, and in 1865 a statue of him by Sir John Steell was erected in Princes Street.

Wilson's works, collected and edited by his son-in-law, Professor Ferrier (12 vols. 1855–58), include *Lights and Shadows of Scottish Life* (1822), *The Trials of Margaret Lyndsay* (1823), and *The Foresters* (1825), as well as thirty-nine out of seventy of the 'Noctes Ambrosianæ,' which appeared in *Blackwood's* during 1822–35, and are dialogues named after 'Ambrose's Tavern,' the interlocutors comprising 'Christopher North,' 'Tickler' (his uncle, Robert Sym, 1750–1844), and the 'Shepherd' (Hogg). They in their day and in Scotland enjoyed an amazing vogue, and they are still remembered if not much read, while his poems and tales are well-nigh forgotten. Remembered and yet unread, in spite or because of *The Comedy of the Noctes, selected by John Skelton* (1876), where, if the selections had been the omissions, the result might have been more tolerable. A fine manly, healthy character, a true lover of Nature and Sport, and a first-rate exponent of both, Wilson was all this and something more; but he was not a humorist, though he was always trying to be humorous. Guffaws, not laughter, run through all his writings, which Hallam likened to 'the rush of mighty waters;' the outrush of his own haggis seems a much more appropriate simile.

See the Memoir by his daughter, Mrs Gordon (1862); an article by Mr T. Watts in the *Athenæum* (July 8, 1876); and Mr Saintsbury's *Essays in English Literature* (1891).

Wilson, JOHN, Indian missionary, was born a farmer's son near Lauder, in Berwickshire, 11th December 1804. Educated at Edinburgh University, he went in 1828 to Bombay as a missionary; and here he laboured—from 1843 under the flag of the Free Church of Scotland—till his death, 1st December 1875. His mastery of the languages of Western India, and grasp of the literature, the

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history, the faiths, and the social usages of the races of India, combined with his energy, sagacity, and broad sympathy to give Wilson an unexampled influence. An active promoter of education, legal reform, toleration, and philanthropic movements of every kind, he was much consulted by government, especially during the crisis of 1857. He was twice president of the Bombay branch of the Asiatic Society, and was vice-chancellor of the Bombay University, F.R.S., and Moderator in the Free Church Assembly in 1870. His chief writings were *The Parsi Religion* (1843) and the *Lands of the Bible* (1847). See the Life by Dr George Smith (1878).

His son, ANDREW (1830–81), was born at Bombay, and studied at Edinburgh and Tübingen. He was for three years editor of the *China Mail*, and later of the *Bombay Gazette*, wrote much for *Blackwood* and other serials, but is best known for his account of Gordon's *Ever Victorious Army* (1868) and his book on the Himalayas, *The Abode of Snow* (1875). He also wrote a *Schiller* for the 'Foreign Classics' series.

Wilson, JOHN MACKAY, the originator of the *Tales of the Borders*, was born at Tweedmouth in 1804, failed to make his bread in London, and after writing dramas and poems, and lecturing with much applause but little profit, became in 1832 editor of the *Berwick Advertiser*. But in his days of hardship he had formed habits of intemperance, and after a short illness he died at Berwick-on-Tweed, October 2, 1835. His *Tales* long had a vogue in Scotland not exactly commensurate with their deserts. They were originally issued from Berwick in weekly numbers, beginning November 8, 1834, and in six months had reached a circulation of 30,000. Wilson worked unaided till the end, but thereafter the *Tales* were continued for his widow's behalf by Sutherland, an Edinburgh bookseller, who employed Alexander Leighton (1800–74) as editor. Among the writers were Leighton, [Sir] Theodore Martin, Hugh Miller, 'Delta,' Professor Thomas Gillespie, and James Maidment.

The *Tales of the Borders* were first collected in six quarto volumes (1835–40). A new edition, revised by Leighton, extended to 20 vols. (Manchester, 1857–59); his 1869 revision contained four volumes more.

Wilson, RICHARD, landscape-painter, was born at Penegoes rectory, Montgomeryshire, 1st August 1714. After studying under a London portrait-painter (1729–35), he took to portrait-painting on his own account, but during a six years' visit to Italy (1749–56) was advised to forsake portrait for landscape. To landscape-painting he now exclusively devoted himself; and before returning to England he had succeeded at Rome in establishing a considerable reputation. In London in 1760 he exhibited his great picture, the 'Niobe,' and at once secured rank as one of the first painters of his time. Another celebrated work was his 'View of Rome from the Villa Madama.' Failing, however, to hit the general taste, he fell into the hands of the picture-dealers; and so straitened did he frequently find himself that in 1776 he was glad to obtain the appointment of Librarian of the Royal Academy. By the death of a brother he came into a small estate at Llanferras in Denbighshire, and retiring there died some few years after in 1782. Of his numerous pictures, now much prized, many were engraved by Woollett and others; the National Gallery contains nine specimens of his work.

Wilson, GENERAL SIR ROBERT THOMAS, was born in London in 1777, had his education at Westminster and Winchester, and when scarcely seventeen joined the 15th Light Dragoons, and saw some sharp service in Belgium. In 1798 he was engaged in Ireland in the suppression of the rebellion, next served in the unfortunate campaign of the Helder, commanded Sir Ralph Abercromby's cavalry in Egypt, took part in the conquest of the Cape of Good Hope in 1806, and next went abroad on the staff of Lord Hutchinson, who was sent on a mission to the king of Prussia, then a fugitive from his capital. He witnessed the desperate battle of Eylau, and on the peace of Tilsit returned to England. He was next sent to the Peninsula, helped to train the Portuguese army, and under Wellington commanded a Spanish brigade at Talavera. In 1812 he was attached to the Russian army as English military commissioner, and during the struggle which resulted in the capture of Moscow, and the pursuit of the doomed French army, he rendered important service both in council and in the battlefield. Throughout subsequent campaigns in Germany and in France he was present in a similar capacity in the camp of the allies, and at Lützen he took command of the Prussian reserve. After the peace he became involved in the unfortunate matter of Queen Caroline, and was dismissed the army, but afterwards reinstated. In 1841 he attained the rank of general; from 1842 to 1849 held the post of governor of Gibraltar; and from 1818 to 1831 sat in the Liberal interest for Southwark. He died suddenly in London, 9th May 1849.

He wrote a *History of the British Expedition to Egypt*—the source of the horrible charge that Napoleon poisoned his sick at Jaffa; *Inquiry into the Present State of the Military Force of the British Empire* (1804); *Campaigns in Poland, with Remarks on the Russian Army* (1810); and *Sketch of the Military Power of Russia* (1817). His *Private Diary* during his foreign campaigns was edited by his nephew and son-in-law, the Rev. Herbert Randolph (2 vols. 1861), who also prepared a Life (2 vols. 1863).

Wilson, THOMAS, English divine and saint, was born at Burton in Cheshire, September 20, 1663, made his studies at Trinity College, Dublin, and served as curate of Newchurch Kenyon from 1686 till 1692, when he became chaplain to the Earl of Derby, who appointed him Bishop of Sodor and Man in November 1697. For fifty-eight years he governed his diocese with constant care, and entered into his rest on March 7, 1755. His *Principles and Duties of Christianity* (1707), commonly called the Manx Catechism—the first book printed in the native tongue—and his *Essay towards an Instruction for the Indians*, written for Oglethorpe's Georgia plantation scheme, and submitted to Isaac Watts (published only in 1740), were combined to form *The Knowledge and Practice of Christianity made easy to the Meanest Capacities* (1755). But his name best survives in his admirable *Short and Plain Instructions for the Better Understanding of the Lord's Supper* (1736), and *Sacra privata, Private Meditations, Devotions, and Prayers* (1800). Other books are *Parochialia, or Instructions for the Clergy* (1788), and *Maxims of Piety and Christianity* (1789). He instituted a Manx translation of the Bible, which was completed 1772–75. The first collection of Bishop Wilson's works was made by the Rev. C. Cruttwell (Bath, 1781); the best is that by Keble in the 'Library of Anglo-Catholic Theology' (Oxford, 7 vols. 1847–52), with a prolix Life, itself reprinted (2 vols. 1863).

Wilton, a market-town of Wiltshire, at the confluence of the Nadder and Wyly, feeders of the Avon, 3¼ miles WNW. of Salisbury. The ancient capital of Wessex, it gave name to the county, and was the scene of Alfred's first battle as king with the Danes (871), and the seat of a bishopric (909–1050), but after 1244, when it had twelve churches, declined through the diversion of the great western

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road. The present church, erected in 1844 by Lord Herbert of Lea at a cost of £20,000, is an ornate Lombardic structure, with a wealth of marbles, mosaics, and stained glass, and a campanile 108 feet high. On the site of a Saxon nunnery is Wilton House, the seat of the Herberts (q.v.), where Sidney wrote part of the *Arcadia*. It is famous for its Van Dycks and other art-treasures, and for the beauty of its grounds. Since Elizabeth's reign Carpets (q.v.) have been manufactured at Wilton, which is a municipal borough, first chartered by Henry I., and reformed in 1885. It returned two members till 1832, and then one till 1885. Pop. 2120.

See the *Registrum Wiltunense* (Lond. fol. 1827), and James Smith's *Wilton and its Associations* (Sal. 1851).

Wiltshire is an inland English county, bounded on the N. by Gloucestershire and Berkshire, on the E. by Berks and Hampshire, on the S. by Hants and Dorsetshire, and on the W. by Somersetshire and Gloucester. Its greatest length, north to south, is 54 miles; its greatest breadth, east to west, is 37; and the area is 1354 sq. m. or 866,677 acres. Pop. (1801) 183,820; (1841) 256,280; (1881) 258,970; (1891) 264,969. This unusually small proportion of inhabitants is due to the presence of extensive tracts of open pasture-land in the centre and north of the county—Salisbury Plain and the Marlborough Downs. The river systems of the county divide near Devizes, whence the Lower or Somersetshire Avon, entering Wilts from Gloucester, flows to the Severn below Bristol; the Southern or Hampshire Avon flows by Salisbury to the English Channel at Christchurch; and the Kennet flows to join the Thames at Reading, thence to the German Ocean. The chief Wiltshire feeders of the Lower Avon are the Newnton, Merden, Broughton, and Whaddon; and of the Southern Avon, the Wyly (joined by the Nadder at Wilton) and the Bourne. By far the larger portion of the county is occupied by Chalk. This forms in the main a great upland separated by a broad hollow of Greensand, ranging by Devizes to Burbage, into the Marlborough Downs and Salisbury Plain, and rising on the Berkshire border into the highest point of the English Chalk, Inkpen or Hackpen Beacon (972 feet). Greensand also borders the Chalk north and west, and is succeeded by a band of Oolite exposing the Purbeck and Portland beds, the Kimmeridge Clay, Coral Rag, and Oxford Clay—the latter ranging from Frome, by Bradford, Chippenham, and Malmesbury. London and Plastic Clay and Bagshot Sands extend somewhat into the county from Berks and Hants; and there are Quaternary gravels near Salisbury and Melksham. The Wiltshire Oolites are in parts highly fossiliferous, and at points yield valuable building-stone—as at Fonthill, Tisbury, Chilmark, Swindon, Corsham, and Box. Iron ore was worked and smelted in the county in remote antiquity, but of late only in the vicinity of Seend, and since of Westbury, the upper beds of the Coral Rag there consisting of oolitic grains of hydrous oxide of iron cemented by calcareous matter. The railways are connected with the Great Western and London and South-Western systems, and the former company has extensive works at Swindon (q.v.). The industries are chiefly agricultural—dairy-farming predominating in the north, and grazing in the south. Large flocks of sheep feed on Salisbury Plain. There are extensive factories at Calne, which send out the Wiltshire bacon. There is also an important manufacturing element—Bradford and Trowbridge still maintain the old reputation of the West of England for the highest quality broadcloths; and the Wilton carpets are made at the town of that name. Marlborough is the seat of a great public school. The flora is noteworthy, and includes a number of rare plants. Though the rolling open country is as a rule monotonous and tame, there is much charming scenery in the valleys and amongst the broken hill districts, especially of its western borders; while there are fine stretches of woodland connected with its numerous seats—especially at Savernake, Bowood, Longleat, Wardour, and Wilton. Savernake Forest and Cranbourne Chace, indeed, have undergone little change for centuries. Wiltshire was well settled by the Romans, and played a prominent part in early Saxon days; and the defeat of the British by Cynric at Old Sarum in 552 was the first important Saxon success. Four years later the victory of Cynric and Ceawlin at Barbury included the shire in the West Saxon kingdom, of which Wilton eventually became the capital. At Wilton Alfred suffered his first defeat from the Danes; and Edington, near Westbury, is suggested as the Ethandune where he defeated Guthrum. Wilton was the scene of another battle of note in the wars of Stephen and Matilda, when the presence of numerous castles and garrisons brought great suffering on the inhabitants of the district generally. The early importance of Wilton—itself named from the river Wyly—caused it to give name to the county as Wiltonscira. Waller's defeat at Roundway Hill, Devizes, and the gallant defence of Wardour Castle by Lady Arundell were the chief local episodes of the Great Rebellion. The civil record of Wilts is peculiar. Before 1832 it sent thirty-four members to parliament, including two from Old Sarum, which had neither house nor inhabitant. Old Sarum, Downton, Great Bedwyn, Heytesbury, Hindon, Ludgershall, and Wootton Bassett were then swept away, Calne, Malmesbury, Wilton, and Westbury reduced to one each, and the total made eighteen. Till 1867 the number of members was eighteen, then till 1885 fifteen, and now it is six only—five for county divisions and one for Salisbury. The municipalities are Calne, Chippenham, Devizes, Malmesbury, Marlborough, Salisbury, and Wilton.

From the standpoint of the archæologist Wilts is the premier county in England. Stonehenge has been famed for ages throughout the civilised world. Still more remarkable are the less-known, much-ruined megalithic circles and avenues of Avebury—'as much excelling Stonehenge as a cathedral doth a parish church'—while Silbury Hill, near by, is the largest tumulus in Europe. Barrows of various kinds so abound that it was in Wiltshire barrow-digging first became a science. Relics of palæolithic man are yielded by the river gravels near Salisbury and elsewhere; and thence downward human representation may be regarded as complete. Earthworks, like barrows, are exceptionally numerous. The Wansdyke stretches across the north of the county for miles, traversing the Marlborough Downs. Grimsditch intersects the south of the county near Downton. The huge ramparts of Old Sarum are unique in their record of successive occupation on English soil—in turn the stronghold of Celt, Roman, Saxon, Norman, and seat of the see until Salisbury was founded in the lowlands by the river. Bradford-on-Avon contains the most perfect Anglo-Saxon church in existence. Salisbury Cathedral is the noblest illustration of the Early English style. The Norman castle of Devizes was unmatched in England, but neither of that nor of its sister fortalices are there many traces left. There is magnificent Norman work in the remains of Malmesbury Abbey. Domestic buildings of the 14th and 15th centuries are numerous and good. Longleat has been regarded as the finest Elizabethan mansion in the kingdom. Among modern structures the most

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remarkable is the Lombardic church at Wilton built by the first Lord Herbert of Lea.

See the articles AVEBURY, SALISBURY, STONEHENGE, WHITE HORSE, &c.; works by John Aubrey (ed. by Rev. J. E. Jackson, Devizes, 1862), Sir R. C. Hoare (8 vols. 1812–44), John Britton (3 vols. 1801–25), H. Moody (Winchester, 1851), J. E. Jackson (2 vols. 1867–72), W. H. Jones (3 vols. 1865–80), E. Kite (Devizes, 1880), Stratford (1882), R. Jefferies (*Life in a Southern County*, 1882), A. C. Smith (1884–85), and the present writer, R. N. Worth (1887), besides the *Wilts Archæological and Natural History Magazine* (since 1853).

Wimbledon Common, an open, breezy heath of 628 acres, 7 miles SW. of London. Here from 1860 till 1889 in July was held the annual meeting of the National Rifle Association, since transferred to Bisley near Woking. Linnæus here first saw the gorse in bloom; and here many duels were fought. Wimbledon now is practically a suburb of London, with a number of magnificent houses. Pop. (1871) 9087; (1891) 25,758.

Wimborne, a market-town of Dorsetshire, at the confluence of the Allen and Stour, 7 miles N. of Poole and 25½ E. of Dorchester. Here, about 705, St Cuthburh, King Ine's sister, founded a nunnery, which Edward the Confessor refounded as a collegiate church—the noble cruciform minster, Norman to Perpendicular in style, with a central and a west tower, and the tomb of Ethelred I. There is also a grammar-school (1496; refounded 1563). Coach-building and the manufacture of buttons and woollen hose give employment. Pop. of parish, 5400. See works by P. Hall (1853) and Yeatman (1878).

Winchelsea, a decayed Cinque Port of Sussex, affiliated to Hastings, is 2 miles SW. of Rye by rail, and from 1832 to 1885 was included in the parliamentary borough of Rye. The present ancient city, which has a population of about 1000, is New Winchelsea. Old Winchelsea, often named in the history of the 11th, 12th, and 13th centuries, stood 3 miles SE., but was often inundated by the sea, and finally submerged and destroyed in 1287. New Winchelsea was built on a remarkably regular quadrangular plan under the immediate auspices of Edward I. Of the old church of St Thomas, which dates from 1300, the chancel with aisles and part of a transept remains, containing some fine canopied tombs. Parts of a Franciscan monastery are to be seen; and three of the gateways of the fortified city remain. The town gives an earl's title (in the form Winchilsea) to the family of Finch-Hatton, a title now conjoined with that of Earl of Nottingham.

See CINQUE PORTS; the *English Illustrated Magazine* for 1890; and F. A. Inderwick, *The Story of King Edward and New Winchelsea* (1892).

Winchester, the city of Hampshire, is situated on the Itchen, 60 miles WSW. of London. It originated, as some other towns, in a tribal settlement placed for safety on the summit of a hill. As the settlers became more numerous they descended the slope (St Catherine's) to the more convenient plain, which, in contradistinction to their former abode, they named 'Gwent,' or the hollow. The monoliths here found, and called 'druidical,' were probably brought down into the valley by drifts in early ages. The Romans, on coming up the river, observed the advantages of the site, took possession of the town, and formed its future plan. They made it rectangular, the main streets crossing at right angles, and the principal one corresponding with the present High Street. Alongside of the wattled huts of the 'Belgæ' soon grew up city walls, temples (to Apollo and Concord), and other evidences of southern civilisation. A head college for flamens was established, and, if the record be true, the first Christian church in Britain was built here, 169 A.D. Tesselated pavements and many relics of this interesting period are preserved in the museum of the new guildhall, while the walls of Wolvesey are studded with Roman bricks and drums of columns. The church was converted into a 'temple of Dagon' (Woden?) by the Saxons, 495 A.D. The Romans spelt the name *Venta;* but perhaps the old pronunciation survived. The Saxons restored the form in *Wintanceastre.*

The palmy days of Winchester, when it disputed with London the claim to be the capital of England, were during the last three Saxon and first two Norman centuries. Early in the 7th century an Italian monk, Birinus, converted King Cynegils, whose son gave all the land as far as 7 miles round Winchester—some of it is still held by the dean and chapter—for the establishment of a new church. Moreover, the palatial fortress of Wolvesey was the royal residence of the kings of Wessex, which became England. Alfred the Great, educated here at the Prior's School, resided during his long reign at Winchester, of which his tutor St Swithun (see SWITHIN) was a native and afterwards a bishop. At Wolvesey his scribes compiled the 'Anglo-Saxon Chronicle,' the first English prose book, assisted by the king himself, who ordered that the volume should be kept there; it is now in Corpus Christi College, Cambridge. His queen founded St Mary's nunnery here—the site now marked by Abbey House—in which her daughter in pious humility washed the nuns' clothes. Alfred also founded the 'New Monastery,' afterwards called from his favourite master, 'St Grimbalds.' After the king's death the monks by trickery obtained his body, which had been buried in the adjacent monastery of St Swithun's, and, becoming also possessed of the bones of St Josse, caused a rich stream of miracles to flow forth. Cnut (Canute) presented them with a great cross, containing sixty pounds of silver and fifteen of gold. But in Edgar's reign a cathedral had arisen which far surpassed this or any other ecclesiastical edifice in England. Bishop Æthelwold, with Dunstan, introduced the stricter monasticism, but was not above using a 'vocal cross' and disregarding the rights of property. He erected a magnificent building, which had numerous altars, a tremendous organ, a lofty tower with golden gargoyles and balls like stars, a marvellous weathercock, and a crypt which became the burial-place of kings and bishops. But chief attraction here was the body of St Swithun and the miracles it produced.

The abbot of the 'New Monastery,' being Harold's uncle, went in arms with some of the monks to the battle of Hastings. William was greatly displeased, and when he built his palace at Winchester, which extended from the present Butter Cross to Minster Street and Lane, the monks were so much circumscribed that they were glad to move across to Hyde Mead, on the north-west of the city. This took place in 1110, and thirty years afterwards the abbey was destroyed by fire-balls from Wolvesey. Bishop de Blois, who had rebuilt that castle and filled it with art-treasures—some ruins remain—sided with his brother Stephen in his conflict with Matilda in 1141, when the south of Winchester supported the king and the north the empress. The fight raged for seven weeks in the heart of the city. The monastery was soon afterwards rebuilt; in 1390 the abbot was mitred, and at the dissolution the silver was calculated to be worth 2000 marks. In 1788 a bridewell was constructed out of the ruins, but portions of St Bartholomew's Church appear to be old. Beneath the east window lie the bones of five persons found here in 1867, and supposed to be those of King Alfred, his queen, two sons, and St Grimbald.

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The castle of Winchester is said to have been built by order of the Conqueror, and certainly was in existence in the reign of Henry I. The Norman castle consisted of a tower 52 feet square, and had walls 14 feet thick. Here was kept for some years the celebrated Domesday Book; here Earl Godwin died suddenly at a banquet, for his sins it was said, and here in 1097 Anselm and Walkelin had a fierce contest about the claims of pope and king. The succeeding castle had round towers 30 or 40 feet wide, with walls from 8 to 10 thick, and had subterranean passages radiating in three directions. Henry III. ('of Winchester') was born here, and resided in the castle, which was then decorated with mural painting, statuary, and marble pillars. It had also a Mappa Mundi and Wheel of Fortune —the latter may have been turned into 'Arthur's Round Table,' which now hangs in the hall. Owing to a confusion between this Gwent and the one in Monmouthshire, Arthur's legends were transferred to Winchester, probably before Henry II.'s time, and this mistake caused Henry VII. to give the name of that hero to his eldest son, who was born in this castle. We first hear of the Table in Henry VI.'s reign; Henry VIII. showed it to Charles V., and it has not been repainted since. On the parapet of this castle Edward I. fixed a quarter of the last native Prince of Wales; Isabella there spiked the head of Despencer Earl of Winchester, and she had Edmund of Woodstock decapitated on the green below. Here Raleigh, after his trial at Wolvesey, was imprisoned, and several of his companions were beheaded. The castle had become much dilapidated before the Cavaliers took refuge here—soon to surrender to Waller. The city and castle were retaken by the royalists, but finally yielded to Cromwell, who was here in person in 1645. One tower of the castle remains, with the fine hall 110 feet long, adorned with pillars of Purbeck marble. For 400 years after the Conquest the parliaments of England occasionally sat in it, and now it is used as a law-court. Hard by stands the red brick palace of Charles II., now a barrack.

The fantastic cathedral of the Saxons did not accord with Norman ideas, and Bishop Walkelin, a kinsman of William, demolished it, and built (1079–93), partly perhaps on the same site, a dark and ponderous pile. He commenced two western towers, the foundations of which have been traced. The central tower fell in 1107, but was soon rebuilt. As there are no quarries near Winchester, the stone for this and for the castle was brought from the Isle of Wight. This great edifice forms the substantial part of the present cathedral, and is visible in places. The Early English retro-choir still exists, built by Bishop de Lucy seventy years later. But 250 years produced dilapidations, and Bishop Edington commenced to renovate in the Perpendicular style, building the west porch and three windows in the aisles. Wykeham, his successor, carried on the work, finished the south aisle, and began the north. He pulled down the heavy triforium, and carried the pillars up to a great height, casing the round Norman ones; replaced the small round-headed clerestory windows with large pointed lights, and added an arched stone-groined roof, producing by this transformation the finest Perpendicular nave extant (see Vol. VIII. p. 59). The work was completed by Cardinal Beaufort and Bishop Wayneflete. Specially interesting are the monuments and unrivalled chantries in this cathedral. In the centre of the choir stands an ancient tomb, said to be that of Rufus, but more probably that of De Blois. We may also notice those of Bishops de Lucy, De la Roche, Edington, Wykeham, Cardinal Beaufort, Wayneflete, Langton, Gardiner, Fox, North, Jane Austen, and Izaak Walton. The resting-places of the Saxon kings and bishops are unique—coffers perched on the partition walls of the choir. This collection was commenced by Bishop de Blois—two of whose chests remain, and was completed by Bishop Fox, but some of the names are probably not correctly inscribed. In the Civil War the soldiers pillaged the cathedral, and, knocking down the chests on the north side, scattered the bones and used them for breaking the windows. This cathedral is the longest in England (520 feet) except Canterbury, which exceeds it by five feet. It has an ancient sculptured font said to have been presented by De Blois. In the library are some Anglo-Saxon charters, 12th-century books, bishops' rings, and other treasures. Walkelin obtained from Rufus the right of holding a fair on St Giles' Hill, which became the greatest but one in England.

A great impulse was given to education when in 1369–93 Winchester College was founded here by Wykeham. Some monks had previously given instruction, but nothing on a grand scale had been attempted. This foundation, called the 'New College,' was original in that it was non-monastic, and was in connection with a college at Oxford. It was intended for priests, and especially for those of limited means. The building, placed in the Soke or Liberty, a district under episcopal jurisdiction, was protected by the vicinity of the cathedral, monastery, watch-house, and Wolvesey Castle, but the site was so marshy that it was partly erected on piles. This edifice is that at present existing, with the exception of the chantry chapel, schoolroom, and tower. At the entrance of the kitchen stands the picture of the Trusty Servant —the present costume is that of the 18th century, though the picture is supposed to have been placed here by Johnson, head-master in 1560, and is a copy from the French. The hall is magnificent, 53 feet in length, with oak panelling and fittings. Here little flat squares of board, formerly the dinner plates, are still used for bread and butter. In the schoolroom, built by Warden Nicholas (1687), stands the celebrated signboard painting, as old as the middle of the 15th century, informing the schoolboy that he must learn, leave, or be flogged with a four-twigged rod. The foundation was for a warden, ten fellows, three chaplains, an usher, and seventy scholars. In 1857 the fellowships were reduced to six. Here the system of 'monitors' originated, and they alone, about twenty, were allowed to have fags: servants now do most of the fagging. Until the middle of the 16th century the boys' beds consisted of some straw thrown on the concrete floor. There were always some boys who were not on the foundation, and as they increased 'Old Commoners' was built in 1730 for their accommodation. Dr Moberly built in 1838 the present head-master's house, new halls and dormitories. The last-named are now class-rooms, and the commoners are lodged in nine tutors' houses, each containing thirty-four boys, two or three in a room. The expenses of a commoner amount to about £150 a year. The number of boys in the school is now about 450. Those on the foundation are elected between twelve and fourteen years of age by competition. There are several exhibitions and scholarships varying from £25 to £50 a year, and three gold medals. A rifle corps was established in 1860; there is a little boating, and a football game peculiar to the school; an annual cricket match is played with Eton. Many great men have been educated at Winchester, as Archbishops Warham and Howley, Sir Thomas Browne, Bishop Ken, the poets Collins, Warton, Young, Otway, and Bowles, Louth of the Commentaries, Lempriere of the Dictionary, Dr Arnold of Rugby, Sydney Smith, and Lord Sherbrooke.

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There are two hospitals in Winchester dedicated to St John, and said to have been founded by Birinus; one has been lately rebuilt, the other has a fine hall belonging to the corporation, and some Decorated windows. Portions of the city wall, mostly built in the reigns of John and Henry III., still remain, and two of the gates. Several of the town houses are ancient; the Butter Cross dates from Henry VI.; and close to it an old clock projects over the High Street in front of the former guildhall. The city once extended to St Cross, Wyke, Worthy, and Magdalen Hill, and in the reign of Henry I. had 20,000 inhabitants, but declined so much after being sacked in 1265 that it has hardly yet regained that amount, the pop. being 13,704 in 1851, and 19,073 in 1891. A free library was established here in 1877. A mile distant stands the interesting hospital of St Cross, founded in 1132 by De Blois, partly from the spoils of Hyde Abbey; but nearly all the present buildings were erected by Cardinal Beaufort.

See Dean Kitchin's *Winchester* ('Historic Towns,' 1890); *Royal Winchester*, by the present writer, the Rev. A. G. L'Estrange (1889); Misses Bramston and Leroy, *Historic Winchester* (1882; new ed. 1884); the Diocesan History, by the Rev. W. Benham (1884); and on the College, the Rev. H. C. Adams, *Wykehamica* (1878); Kirby's *Winchester Scholars* (1888) and *Annals of Winchester College, 1369–1892* (1892); C. W. Holroyd's *Winchester Commoners, 1836–90* (1891); and Wrench's *Winchester Word-book* (1891). See also WYKEHAM.

Winchester, capital of Frederick county, Virginia, in the valley of the Shenandoah, 87 miles by rail WNW. of Washington, with manufactures of gloves, shoes, flour, &c. During the civil war it was the scene of frequent conflicts, and occupied in turns by the Federal and Confederate armies. Pop. 5196.

Winchilsea, ANNE FINCH, COUNTESS OF, poetess, was daughter of Sir W. Kingsmill of Sidmonton near Southampton, and wife of Heneage Finch, who succeeded as fourth earl in 1712. She was a friend of Pope, Rowe, and other poets, and herself wrote fair poetry—her longest poem, on 'Spleen,' in Cowley's manner, was printed in Gildon's Miscellany in 1701. Her 'Miscellany Poems, written by a Lady,' appeared in 1713, and she herself died in 1720. Wordsworth (preface to 1815 volume) commends her delightful pictures of external nature, and Mr Gosse (*Gossip in a Library*, 1891) discovers her to have had a genuine vein of poetry.

Winckelmann, JOHANN JOACHIM, first appreciative critic and historian of Greek art, was born of poor parents, 9th December 1717, at Stendal in Prussian Saxony. After studying for a time at a gymnasium in Berlin, he went in 1738 to the university of Halle as a student of theology, which he gave up for the study of medicine and mathematics at Jena. For a time a private tutor, and then rector of a school, as librarian by Count von Bunau he was taken to Nöthnitz, close to Dresden. He had frequent opportunities of inspecting the famous treasures of art accumulated there; he also made the acquaintance of artists and distinguished dilettanti; and the enthusiasm was awakened which determined his subsequent career. To the theory and history of art he now resolved to devote himself; and on being thrown into the society of the pope's nuncio, Cardinal Archinto, he was induced, after some hesitation, to become a Roman Catholic, on a promise of an appointment being procured for him which would enable him to proceed to Rome. Thither as librarian to Cardinal Passionei he repaired in 1755, having previously published at Dresden a treatise on the imitation of the antique (1754) which secured him a small pension from Augustus III. of Saxony. At Rome he prosecuted his studies with the utmost ardour, and every facility was afforded him. In 1758 he visited Naples to examine the celebrated remains of Herculaneum, Pompeii, and Pæstum, and went also to Florence for the purpose of cataloguing the famous collection of antique gems belonging to Baron de Stosch, a labour which occupied him for nine months. Soon after Cardinal Albani appointed him his librarian. The first-fruits of his studies in Italy appeared in his treatise on ancient architecture (*Über die Baukunst der Alten*, 1762), and two years afterwards the great work of his life, on which he had long been engaged, the History of Ancient Art (*Geschichte der Kunst des Alterthums*), was issued from the press of Dresden. This exposition of the principles and history of Greek art may fairly be described as epoch-making, not for Germany merely but for Europe; and if in many points corrections and modifications of his statements have been made, all subsequent progress in æsthetics is largely an outcome of this work, which from the very first was studied with avidity by men like Goethe and Lessing. Winckelmann also gave to the world the result of his researches at Herculaneum, and in 1766 his *Monumenti Antichi Inediti*, an elaborate work with plates, besides an allegory and many contributions to the periodicals of the time. In 1763 he was made superintendent of all antiquities in and about Rome. In 1768 Winckelmann, by this time famous throughout Europe, set out to revisit Germany. His destination was Berlin; but after visiting Munich and Vienna (where he was received with flattering attentions by Maria Theresa), he resolved to return to Rome. On the way thither he was murdered in a hotel at Trieste (8th June 1768) by a fellow-traveller, Arcangeli, to whom he had shown some tempting gold coins and curios.

An edition of his works appeared in 1808–20; the fullest is that by Eiselein (12 vols. 1825–29). See the Life by Justi (2 vols. 1866–73). There are busts or monuments of Winckelmann in Stendal, Rome, and Berlin; and an annual memorial celebration takes place at Rome and several of the German universities.

Wind is air in motion. The force of the wind is measured by Anemometers (q.v.), of which some measure the velocity, and others the pressure. The following are a few velocities of wind, translated into popular language: 7 miles an hour is a gentle air; 14 miles, a light breeze; 21 miles, a good steady breeze; 40 miles, a gale; 60 miles, a heavy storm; and 80 to 150 miles, a hurricane sweeping everything before it. A few of the accepted comparisons of velocity and pressure may be added: 5 miles an hour represents a pressure of 2 oz. on the square foot; 10 miles, ¼ lb.; 20 miles, 2 lb.; 30 miles, 4½ lb.; 40 miles, 8 lb.; 51 miles, 13 lb.; 60 miles, 18 lb.; 70 miles, 24 lb.; 80 miles, 32 lb.; and 100 miles, 50 lb. During a great storm in 1867 the pressure was 35 lb., the velocity 83 miles. In the Tay Bridge storm (December 1879), which travelled at rates varying from 40 to 70 miles an hour, the velocity of some gusts reached 96 or even 150 miles. The British Association Committee on Wind-pressure have reported cases of 80 and 90 lb. to the square foot; but the whole question of the relation of velocity to pressure cannot yet be regarded as ascertained.

Seamen more than landsmen require to pay attention to variations in the strength of the wind, as well as in its direction, and to adopt such phrases as will render that strength generally intelligible. *Anemometers*, used on land for this purpose, are unsuited to the requirements of seamen, who have found it convenient to divide winds into twelve kinds, in relation to strength, designated thus: *Faint air, light air, light breeze, gentle breeze, fresh breeze, gentle gale, moderate gale, brisk gale, fresh gale, strong gale, hard gale,* and *storm*. This classification was determined in

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1806 by Beaufort according to the amount and kind of sail which one of the ships of the royal navy could safely carry at the moment. These estimates of the wind's force by the scale 0 to 12 mean that 0 represents a calm and 12 a hurricane.

All wind may be regarded as due directly to differences of atmospheric pressure at the same level above the sea as observed at different places; these in their turn being ultimately referable to differences of temperature, and, in a less degree, to differences of humidity. Thus, if the temperature of two adjacent regions become, from any cause, unequal, the air of the warmer, being lighter, will ascend and flow over on the other, whilst the heavier air of the colder region will flow in below to supply its place. Hence a difference in the temperature of the two regions gives rise to two currents of air—one blowing from the colder to the warmer along the surface of the earth, and the other from the warmer to the colder, in a higher stratum of the atmosphere; and these currents will continue to blow till the equilibrium be restored. Winds are classed as Constant, Periodical, and Variable Winds.

Constant Winds.—The Trade-winds.—When the surface heated is, roughly speaking, a whole zone, as occurs in the tropics, a surface-wind will set in towards the heated tropical zone from both sides, and uniting ascend, and then separating flows as an upper current in opposite directions. Hence a surface-current will flow from the higher latitudes towards the equator, and an upper current towards the poles. If, then, the earth were at rest, a north wind would prevail in the northern half of the globe, and a south wind in the southern half. But these directions are modified by the rotation of the earth on its axis from west to east. In virtue of this rotation, objects on the earth's surface at the equator are carried round toward the east, at the rate of 17 miles a minute. But as we recede from the equator this velocity is continually diminished; at 60° lat. it is only 8½ miles a minute, or half of the velocity at the equator; and at the poles it is nothing. A wind, therefore, blowing along the earth's surface towards the equator is constantly arriving at places which have a greater velocity than itself. Hence it will lag behind—i.e. will come up against places towards which it blows, or become an *east* wind. Since, then, the wind north of the equator is under the influence of two forces—one drawing it south, the other drawing it west—it will, by the law of the composition of forces, flow in an intermediate direction—i.e. from north-east to south-west. Similarly in the southern tropic the wind will blow from south-east to north-west. All observation confirms this reasoning. From the great service these winds render to navigation they have been called the Trade-winds. It is only in the Pacific and Atlantic oceans that the trade-winds have their fullest development. In other parts of the trades' zones, such as southern Asia and intertropical Africa and America and adjoining oceanic regions, they are more or less diverted from their course by the unequal distribution of land and sea (on which see MONSOON and METEOROLOGY). In the Atlantic the *North Trades* prevail between 9° and 30° lat., and in the Pacific between 9° and 26° lat.; and the *South Trades* in the Atlantic between 4° N. and 22° S. lat., and in the Pacific between 4° N. and 23½° S. lat. These limits, however, are not stationary, but follow the sun, advancing northward from January to June, and southward from July to December.

The Region of Calms is a belt, 4° or 5° lat. broad, stretching across the Atlantic and Pacific, approximately parallel to the equator. It marks the meeting-region of the north and south trades. Here also occur heavy rains, and thunderstorms almost daily. This belt varies its position with the trades, reaching its most northern limit in July, and its most southern in January. The trade-winds are more strongly marked in the Atlantic than in the Pacific Ocean; indeed, in the western part of the Pacific, to the east of Japan and the Philippine Islands, they are but obscurely marked at all seasons. When the belt of calms nears the African coast, in the Gulf of Guinea, the copious rainfall gives rise to the strong steady-blowing gales of that coast, called *Tornadoes* and *Hurricanes*. In nautical parlance the *doldrums* may be either the region of calms or the calms characteristic of it.

Periodical Winds.—Land- and sea-breezes are the most general, as well as most readily explained, of the periodical winds. On the coast, within the tropics, a breeze sets in from the sea in the morning, at first a mere breathing on the land, but gradually it increases to a stiff breeze in the heat of the day, after which it sinks to a calm towards the evening. Soon after a contrary breeze springs up from the land, blows strongly seaward during the night, and dies away in the morning, giving place to the sea-breeze as before. These winds are caused during the day by the land becoming more heated than the sea, consequently the air over it ascends, and the cool air from the sea flows over on the land to supply its place; and during night, by the temperature of the land falling below that of the sea, when the air, becoming thereby heavier and denser, flows over the sea as a land-breeze. It is within the tropics that sea-breezes are most marked and constant, because there the sun's heat is strongest, and atmospheric pressure is practically uniform, except in those rare instances where it is disturbed by the passage of cyclones. But in countries such as Great Britain, where atmospheric pressure is most commonly greater or less than that of surrounding regions, the strength of the wind blowing from the high to the low barometer is far stronger than that which would result from the disturbance caused by the unequal heating of land and water; and consequently the sea-breeze is not then felt. In the warm months, however, at those times when barometers are nearly uniform over northern and western Europe, there is a gentle sea-breeze all round Great Britain during the heat of the day, and a land-breeze during night. Thus on the coast of Berwickshire during fine settled summer weather, when the temperature of the land is much warmer than that of the sea during the day, in the morning the wind is north-west till about 10 A.M., when it veers to north, falling all the time till finally it sinks to a calm. A little before noon it springs up from north-east or east, veers to south-east from 2 to 3 P.M., where it continues till 7 P.M., when it veers to south and south-west, and gradually sinks to a calm. About sunset it springs up from west and veers to north-west during the night, where it continues till next morning. On the other hand, on the west coast of Scotland north-west winds diminish in force toward sunset, giving rise to the weather saw, 'The west wind is a gentleman and goes to bed.' Quite analogous to the land- and sea-breezes are the monsoons, which, as regards southern Asia, are only the north trades drawn out of their course in summer by the heated land-regions—the south-west monsoon being really only a vast sea-breeze blowing on southern Asia, and lasting several months of the year.

Variable Winds depend on purely local or temporary causes, such as the nature of the ground, covered with vegetation or bare; the physical configuration of the surface, level or mountainous; the vicinity of the sea or lakes;

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and the passage of storms. Within the tropics all except the last of these is borne down, or all but borne down, by the great atmospheric currents, which prevail there in all their force. But in higher latitudes this is not the case; these, therefore, are the regions where variable winds prevail. The most noted of these winds are the Simoom, Sirocco, Solano, and Harmattan. The *Bora* (q.v.) is a cold tempestuous wind, blowing from the Alps down on the Adriatic; and the *Gregale* is a peculiarly cold, parching, and unhealthy wind which in spring and early summer descends on Malta from Greece. The *Puna Winds* prevail for four months in the year in a high barren tableland in Peru called the Puna; as they are probably part of the south-east trade-wind, after having crossed the Andes they are drained of their moisture, and are consequently among the most dry and parching winds that occur anywhere on the globe. In travelling over such regions it is necessary to protect the face with a mask from the glare and heat of the day, and from the intense cold of the night. The *East Winds* which prevail in the British Islands in spring are part of the great northern current which at that season frequently descends from northern over southern Europe. Their origin explains their dryness and unhealthiness. It is a prevalent notion that the east winds in Great Britain are damp. It is quite true that many easterly winds are peculiarly damp; all that prevail in the front part of Storms (q.v.) are damp and rainy, these being simply an indraught of the air towards the low barometer which is advancing from the west at the time; and it is owing to this circumstance that in the east of Scotland the greater part of the annual rainfall falls with easterly winds. All of these damp easterly winds, however, soon shift round to some westerly point. But the genuine east wind, which is the dread of the nervous and of invalids, does not shift to the west, and is specially and intolerably dry. In the third week of May 1866 this character was strongly marked, when at many places in Scotland the humidity was only 40, and on some occasions as low as 29; the degree of this dryness will be appreciated when it is stated that the mean driest month during many years showed a humidity only of 73, saturation being 100. While this wind lasted, the daily range of temperature was double the usual amount, the soil was parched, and the leaves of trees and plants were blackened and destroyed. Deaths from brain-diseases and consumption reach the maximum in Great Britain during the prevalence of east winds. The *Etesian Winds* are northerly winds which prevail in summer on the Mediterranean. They are caused by the great heat of North Africa at this season, and consist in a general flow of the air of the cooler Mediterranean to the south, to take the place of the heated air which rises from the sandy deserts. The *Mistral* (q.v.) is a steady, violent north-west wind, felt particularly at Marseilles and the south-east of France, blowing down on the Gulf of Lyons. The *Pampero* blows in the summer season from the Andes across the pampas of Buenos Ayres to the seacoast. It is thus a north-west wind, and so far analogous to the stormy winds which sweep over Europe from the south-west. But since it comes from the Andes over the South American continent, it is a dry wind, frequently darkening the sky with clouds of dust, and withering all vegetation.

Lord Bacon remarked that the wind most frequently veers with the sun's motion, or passes round the compass in the direction of north, north-east, east, south-east, south, south-west, west, and north-west, to north. This is due to the fact that by far the greater proportion of the storms of north-western Europe follow their course to eastward along paths lying to the north of the British Islands. Dove of Berlin first propounded the *Law of the Rotation of the Winds*, and showed that the whole system of atmospheric currents—constant, periodical, and variable winds—obey the influence of the earth's rotation as they blow from regions of high pressure, where there is a surplus, towards regions of low pressure, where there is a deficiency of air.

Boreas was the north wind of the ancient Greeks, called by the Romans *Aquilo* or *Septentrio; Notus* or *Auster*, the south wind; *Eurus*, the east or south-east; *Zephyrus* or *Favonius*, the west wind. *Africus* (Gr. *Lips*) was south-west.

See METEOROLOGY and STORMS, with works cited; EUROCLYDON, HARMATTAN, ROARING FORTIES, SIMOOM, &c.

Windau, or VINDAU, a Russian seaport, in the province of Courland, 120 miles NE. of Memel. Pop. 6094.

Windermere, or WINANDERMERE, the largest lake in England, called from its beauty 'Queen of the Lakes,' is partly in the county of Lancaster, and partly divides that county from Westmorland. It is nearly 11 miles long and about 1 mile in extreme breadth; is fed by the Brathay and the Rothay, the waters of which become united before entering the lake, and by the streams which drain the neighbouring lakelets of Esthwaite, Troutbeck, and Blelham; and, lying 134 feet above sea-level, discharges its surplus waters southward into Morecambe Bay by the Leven. Next to Wast Water, Windermere is the deepest of all the English lakes, its greatest depth being 240 feet, while Wast Water is 270 feet deep. It contains a number of islands, the largest being 28 acres in area. Soft rich beauty is the principal characteristic of the islands of the lake, of the wooded shores, and of the scenery around; there being a total absence of that wildness and sublimity which characterise some of the other lakes, except at the north end, where Langdale Pikes, Harrison Stickle, Sca Fell, and Bow Fell stand forward prominently in the landscape. The east and west shores are bounded by gentle eminences exuberantly wooded, and numerous villas and cottages peeping out of the woods give an aspect of quiet domesticity to the landscape. About a mile from Waterhead, at the north extremity of the lake, is the town of Ambleside, 1½ mile north-west of which is Rydal, the residence of the poet Wordsworth; in the vicinity of Waterhead is Dove's Nest, the cottage at one time occupied by Mrs Hemans; farther down the east shore is Elleray, famous as the residence of 'Christopher North;' and half-way down the lake, on the eastern shore, is Bowness. The village of Windermere (pop. 1500), nearly a mile from the east shore of the lake, and 300 feet above its level, has a railway station. See LAKE DISTRICT, with map, and works there cited.

Windflower. See ANEMONE.

Windgalls are puffy swellings about the fetlock-joints of animals, particularly of horses, resulting from an increased secretion of synovia arising from work, particularly on hard roads: they are generally unassociated with any pain, heat, or lameness, and are not generally considered to be causes of unsoundness. If the horse be young they may disappear if the animal be allowed a long rest and the parts blistered once or twice. Old horses having windgalls are generally kept at work, the legs being bandaged when in the stable.

Windham, WILLIAM, statesman, was born of an ancient Norfolk family at London, May 3, 1750. He was educated at Eton, at Glasgow University, and University College, Oxford. After the usual course of travel he began to acquire notoriety as an

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opponent of the administration of Lord North, and in 1784 was returned to parliament for Norwich. In 1783, on the formation of the Portland ministry, remarkable for the coalition of Lord North and Mr Fox, he had become principal secretary to Lord Northington, then Lord-lieutenant of Ireland, but ill-health soon obliged him to resign. He followed Burke in his view of the French Revolution, and in 1794 he became secretary-at-war under Pitt. He went out with Pitt in 1801, and denounced Addington's peace of Amiens (1801) in a speech of splendid eloquence. This lost him his seat for Norwich, but he was elected for St Mawes in Cornwall, and on the return of the Grenville party to power (January 1806) he became war and colonial secretary. He helped Cobbett (q.v.) to start his *Political Register* (January 1802), carried a scheme for limited service in the army (1806), and at the general election in October 1806 found a seat in New Romney, and next year at Higham Ferrers. He went out of office in 1807, when the Portland administration was formed, having previously declined the offer of a peerage, and strongly denounced the expedition against Copenhagen, and afterwards the disastrous Walcheren Expedition. In 1808 a clause was introduced by his successor Lord Castlereagh into the Mutiny Act, permitting men to enlist for life, contrary to Windham's scheme of limited service, which was, however, readopted in 1847. Windham died June 4, 1810.

Windham was a brilliant talker, an excellent speaker, and in the field of letters Dr Johnson, who loved him much, called him *inter stellas luna minores*. He was a member of the famous Literary Club, and he was one of the group around Johnson at his death. All his qualities and talents were neutralised by an intellectual timidity, a morbid self-consciousness, and a fondness for paradox. In his lifetime he was nicknamed the 'weather-cock.' In 1802 he opposed the abolition of bear-baiting 'as the first result of a conspiracy between the Jacobins and Methodists to render the people serious;' and we are told that he had a passion for pugilism, and was a regular attendant upon prize-fights.

His speeches were collected in 3 vols. in 1806, with a Life by his secretary, Thomas Amyot; his *Diary from 1784 to 1810* was edited by Mrs Henry Baring (1866).

Wind-instruments. See MUSIC, Vol. VII. p. 360, and BAND.

Windischgrätz, PRINCE (1787–1862), Austrian field-marshal, played a conspicuous part in suppressing the revolution of 1848–49 at Prague and Vienna, and as generalissimo in Hungary defeated the Hungarians in several battles, but was superseded after his defeat by them at Gödöllo.

Windlass, a modification of the wheel and axle, used for raising weights, lifting water from a well, or on shipboard for hoisting the anchor. A usual form is a horizontal beam supported by spindles moving in collars or bushes, and forced round by handspikes inserted in holes in the beam. Pawls acting on a toothed-wheel prevent the beam from slipping. Windlasses are often worked by steam-power.

Windmill is a mill for performing any class of work in which fixed machinery can be employed, and in which the motive-power is the force of the wind acting on a set of sails in a manner similar to that of a current of water impinging obliquely on the float-boards of a water-wheel. The origin of windmills is altogether lost in the oblivion of the past, though their introduction into Europe is generally ascribed to the Saracens through the Crusaders. Early writers record the employment of windmills in Europe in the 12th century, mention being found of disputes in reference to tithes in connection with them. Windmills are specially adapted for use in those new countries where fuel is scarce and work may be intermittent. Economy in working forms a special feature of the utilisation of wind-power. In good situations, and under ordinary conditions, a windmill will average about eight hours' operation out of the twenty-four. At the commencement of the 19th century the whole of the grinding, stamping, sawing, and draining of the eastern counties of Great Britain was performed by wind-power; since then the steam-engine has replaced the windmill to a considerable extent, though the latter is still found extensively in the low countries on both sides of the North Sea; whilst both in France and the United States the economical if intermittent power of wind is largely utilised. The latest development of wind-power, and one for which it would appear eminently adapted, is for charging electrical accumulators, and its employment in this capacity, as advocated by Lord Kelvin of Largs, seems destined to largely increase. Windmills may be employed for supplying economical auxiliary power to steam-engines, the latter working only in periods of calm. In illustration of this an arrangement at Faversham may be quoted where a 15 horse-power windmill auxiliary to the steam-engine raised 21,000,000 gallons of water in ten months from a depth of 109 feet, thereby saving a consumption of 100 tons of coal.

The energy of the wind in actuating a windmill is exerted upon four or more vanes known as 'sails' (fig. 1, *b*, *b*), radiating from the 'wind-shaft,' *d*. The obliquity of a windmill sail, or the angle

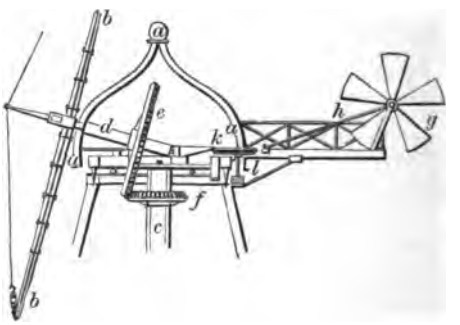

Fig. 1.

which it makes with its plane of revolution, is called its 'weather.' In the oldest or 'post' mills the entire structure was carried on a post, a long lever being provided to turn it and enable the sails to face the wind. In the 'tower,' 'smock,' or 'frock' mill (fig. 1) there is a fixed tower with a rotating cap, *a*, *a*, *a*. This cap carries the wind-shaft, *d*, and is turned by hand in the older, and automatically in the later mills, so that the sails at all times face the wind. The motion which the sails communicate to the axis is transferred by the bevelled wheels, *e* and *f*, to the upright shaft, *c*, which actuates the machinery below. The axis *d* of the sails is inclined at an angle of from 5° to 15° to the horizon to enable the sails to revolve clear of the base of the tower. The transference of the plane of rotation of the sails to right angles with the wind was formerly effected by manual labour applied by a winch at the bottom of the tower, actuating an endless band and rotating the dome above through a rack.

About the year 1750 Andrew Meikle devised a successful automatic appliance for moving the sails so as to catch every wind. He placed a supplementary set of revolving vanes of about 10 feet diameter at the back of the rotating cap and at

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right angles to the cardinal sails; by reducing the motion of the new set of vanes about 5000 times by means of worms, he caused the cap to veer round to the wind. This apparatus consists of a revolving 'flyer' or fan (fig. 1, *g*) projecting from a gallery fastened to the dome on the side opposite to the sails; *h*, a long shaft of small diameter with a spur wheel at the end furthest from the mill, geared into a corresponding wheel on the axis of the flyer (these wheels are not seen in fig. 1, being behind the flyer); and a pinion at the other end of the shaft acting upon cog-wheel *k*, which carries on the lower extremity of its axis a pinion, *l*, which can at pleasure be geared into the rack on the lower edge of the dome. The construction of the sails, generally four in number, is shown in fig. 2.

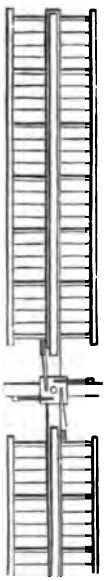

Fig. 2.

Each sail consists of a 'whip' or radius, usually from 30 to 40 feet long, firmly fastened at right angles to the sail-axle, and pierced at from one-sixth or one-seventh of its length from the axle to its extremity with about twenty holes, into each of which a crossbar from 5 to 6 feet long is inserted, and this framework strengthened by light rods connecting the ends of the crossbars is then covered with canvas in the older mills. The crossbars, however, are not set in the plane of revolution of the whips; for in such case the wind, acting in a direction coinciding with that of the sail-axle, would impinge perpendicularly on the sails, and no rotatory motion would result; the bars, therefore, are set at an angle varying, as the velocity increases, from sail-axle to outer extremity. A variation of the angle from 18° at the first crossbar to 7° at the extremity is a very effective form. The amount of sail that a windmill can carry with advantage is limited, according to Smeaton, to seven-eighths of the area of the circle described by one whip. Formerly a windmill sail was covered with a sheet of canvas, of which a greater or less extent could be spread according to the strength of the wind. Since then various methods have been devised for reefing the sails—i.e. for varying the surface exposed to the wind while the mill is in motion; in some arrangements rollers are employed on which the canvas can be rolled up, in others boards are furled by sliding behind each other, as in a fan, or turn on axes into different positions, as in a Venetian blind. Sir William Cubitt's automatic reefing arrangement, introduced at the commencement of the 19th century, was of the last-named type, the sails being of thin boards held up to the wind by a weight. As the force of the wind increased the 'valves' were pressed back and exposed less surface. According to Smeaton, the best speed for the tips of the sails, weathered as above stated, is about 2·6 times the velocity of the wind, whilst the same authority gives the effective power of a windmill with sails of best form, and about 15½ feet radius, with a breeze of 13 feet per second, at about one horse-power.

The horse-power of windmills may be derived from the following formula due to experiments by Coulomb: n = the number of sails; A = area of each sail in square feet; V = velocity of wind in feet per second; then horse-power = $\frac{nAV^2}{1,660,000}$, assuming the speed of the tips of the sails to be about two and a half to three times the wind velocity.

The largest windmills in Great Britain are to be found in Norfolk, where the wings describe a circuit of 100 feet diameter, and with a moderate breeze drive six pairs of millstones 4 feet 6 inches in diameter, grinding collectively 30 bushels of flour per hour. In American windmills the sails are not unfrequently arranged in an annulus or disc, and consist of narrow boards or slats arranged radially, each board being inclined at a constant angle of weather. An ingenious form of horizontal windmill was patented by Mr Giraudat of New York in 1861. The peculiarity is in the sails, which are hinged in such a way that the force of the wind acting on one face of them preserves their perpendicularity to it, and secures thereby a maximum effect; but when after a further semi-revolution the other side is presented to the wind the sails are raised to a horizontal position.

Window (Icel. *vind-auga*, lit. 'wind eye') is an opening in the wall of a building for the admission of light and air. In the East, from time immemorial, windows open not upon the street, but upon an interior court, and are usually provided with lattices or jalousies, or stone and alabaster tracery to exclude the sun's rays. The Chinese use instead of window-glass a thin stuff varnished with shining lac, polished oyster-shells, and thin plates of horn. Among the Romans windows were originally closed with shutters; afterwards they were made of a transparent stone, *lapis specularis*—which from the description can be nothing else than mica—and, in the 2d century after Christ, of horn. According to some there are traces of glass windows having been used in Pompeii; but the matter is doubtful. The first indisputable mention of glass windows is made by Gregory of Tours in the 4th century of our era, who speaks of church windows of coloured glass. St Wilfrid, after succeeding to the bishopric of York in 665, filled the vacant windows of the minster with glass. In 674 Abbot Benedict Biscop brought artists from France to glaze the windows of the abbey of Wearmouth; and the Bishop of Worcester did the same in 726. Leo III., in the end of the 8th century, put glass windows into the church of the Lateran. Glass began to be used in windows of private houses in England as early as 1180, in France in the 14th century. As late as 1458 it struck Æneas Sylvius very much that in Vienna most of the windows were glazed. See GLASS.

In ancient temple architecture windows were unknown—the light being obtained either from the door or from openings in the roof. In Gothic architecture, however, the window is one of the most important features, giving, by the infinite variety of its outline, and the graceful forms of its tracery, as much character and beauty to the Gothic edifices as the columns and colonnades of ancient art gave to the classic temples.

Fig. 1.—Bucknell, Oxford.

In the early Gothic or Norman style the windows were small and comparatively stunted—they were either simple narrow openings with semicircular head, or two such grouped together with a larger arch over both, and decorated with the usual mouldings and ornaments of the style (fig. 1). The inside had generally a wide splay, and simple moulding on the angle. Small circular windows sometimes occur in Norman work.

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In the Early English style the windows were elongated, and had pointed arches. They were frequently grouped in twos or threes, and placed so close together that the wall between became a mullion. The wall space over the group contained within an enclosing arch was then perforated with a quatrefoil or other ornamental opening, and thus the simpler forms of tracery were introduced. The interior arches were splayed off, and were frequently very elaborately decorated with shafts and arch mouldings. The lancet window (so called from its shape) is common in this style. Circular windows are also used with tracery formed by little radiating shafts united by small arches. The triangular window, on a small scale, is also occasionally to be met with.

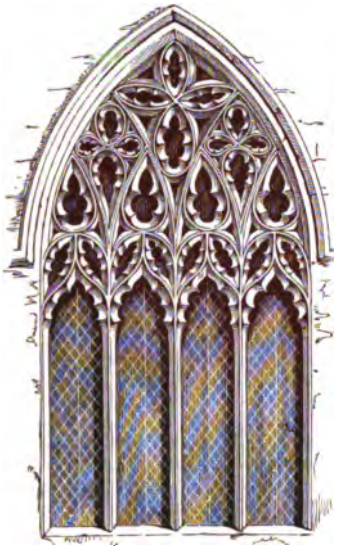

Fig. 2.
Little St Mary, Cambridge, *circa* 1350.

In the Decorated Style (q.v.) the windows become enlarged and filled with mullions and tracery. This was at first simple, and composed of geometric figures such as the origin and progress of tracery naturally led to. As the style advanced, more flowing forms were introduced, until, in the 15th century, the tracery passed into the Perpendicular (q.v.) style in England, and into the Flamboyant (q.v.) in France. The heads of the lights and the apertures in the tracery are usually foiled (fig. 2), and the inner jambs are splayed and ornamented with mouldings, shafts, &c. In elaborately traceried windows the jamb and arch mouldings are occasionally small, but they are usually bold and deep.

In the later Tudor style the window-heads became flattened into the four-centred arch; and in the time of Elizabeth and James I. the arch gave place altogether to the horizontal lintel with the opening divided by mullions into rectangular lights, sometimes foiled at top. Circular or Rose windows, with elaborate tracery, are chiefly found in the Decorated period.

In domestic buildings the windows are similar to the above, but square-headed windows occur more frequently to suit the level line of the floors; and the space between the sill and the floor is recessed and fitted with seats. Transoms are also of common occurrence. The upper part of the window is generally filled with glass fitted into a groove in the stonework, while the lower part is provided with hinged wooden shutters. The Bow or Bay Window (q.v.) is also a frequent and very elegant feature in the later Gothic buildings.

In the revived Classic styles the windows are almost invariably plain rectangular openings, with either a flat lintel or semicircular arch-head. They have sometimes architraves round the jambs and lintel, or are ornamented with pillars supporting an entablature or pediment above. The architraves are frequently carved, and the cornices carried on trusses at each side.

See also the articles GOTHIC ARCHITECTURE, DORMER, GLASS (PAINTED), illustrations of many cathedrals (as those of Amiens, Burgos, Notre Dame at Paris, &c.).

Windpipe. See LARYNX, TRACHEA, THROAT, RESPIRATION, STRANGULATION.

Winds. See SLOVENIANS.

Windsor, a town of Berkshire, on the right bank of the Thames, opposite Eton, 21¼ miles W. by S. of London by rail, 43 by river. The exact meaning of the name is unknown. Its ancient form is *Windleshores*. The kings before the Conquest appear to have had a hunting-lodge here, and Edward the Confessor granted the manor to the abbey of Westminster. Harold, before he assumed the crown, had a castle in the adjoining parish of Clewer, on the summit of a chalk bluff, and after the Conquest the king exchanged Old Windsor with the abbot, but resided occasionally at the castle in Clewer, to which the name of New Windsor was given. This name was also acquired by the town which grew up round the walls of the castle. In the course of centuries the timber defences, which are probably all that Harold left on his mound in Clewer, grew into the stately palace we see now. Henry I. resided much here, and married his second queen in the chapel. Henry II. made additions, especially in the Upper Ward, where some remains of Norman architecture have been identified. John was at Windsor after the granting of Magna Charta. Edward III. was born in the castle, where, in later years, he established what is now the oldest order of chivalry. To receive the knights of St George, or the Garter, the Round Tower was built on Harold's mound. The Black Prince married at Windsor the lady who was called 'the fair maid of Kent,' though she had been twice married and had four children. Froissart mentions the castle where he saw King Edward in mourning for Queen Philippa. David Bruce and James Stuart, kings of Scotland, were prisoners at Windsor. Henry VI. was born here in 1421. Edward IV. built St George's Chapel, in which, with his predecessor, he lies buried. Henry VII. completed the chapel and built the so-called Tombhouse, part of which is, however, of the time of Henry III., who built it in honour of St Edward the Confessor. Henry VIII. gave the chapel of St Edward to Wolsey, who had a magnificent tomb of black marble made for himself. This was stripped of its ornaments at the Commonwealth, and was finally sent to St Paul's for the funeral of Nelson. Henry VIII. was buried in St George's Chapel, beside Jane Seymour. Queen Elizabeth loved Windsor, and built some chambers which still remain on the north side of the Upper Ward, and are now comprised in the royal library. James I. also was much at Windsor. Charles I. is buried in the grave of Henry VIII. Charles II. employed Wren to build the state apartments. James II. turned Wolsey's Tombhouse into a Roman Catholic chapel, and received the papal nuncio here in July 1687. William III. came to Windsor in the winter of the following year, on his famous journey from Torbay to London. Queen Anne used to hunt in the park in a chaise, but lived in a small house on the south side of the castle. It was not much affected by George I. or George II., but George III. made it his principal residence, adding considerably to the Queen's House, and also using the state apartments. Madame D'Arblay has amusingly described court life at Windsor. George III. passed his declining years of dotage and blindness in the lower chambers of Queen Elizabeth's

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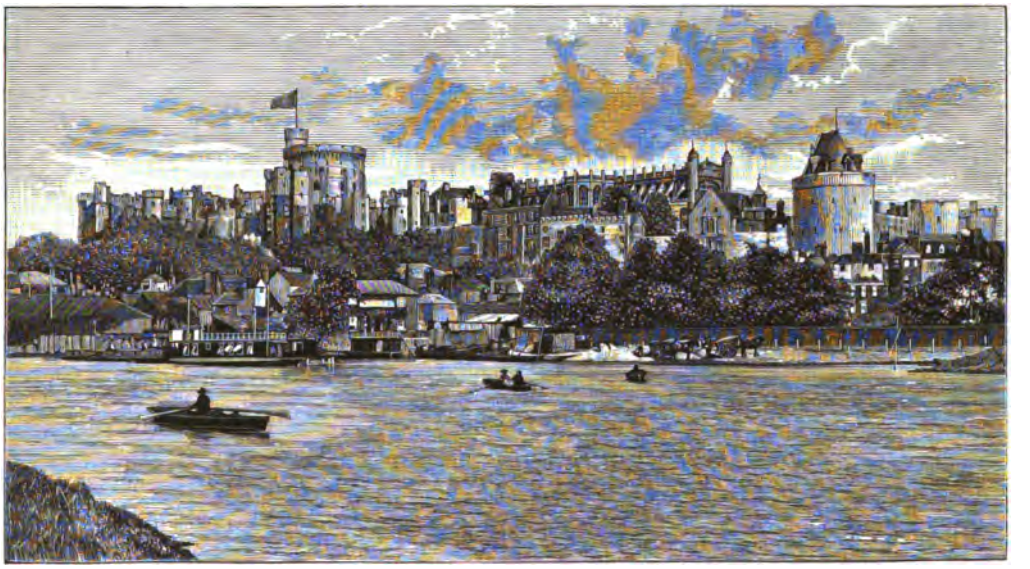
building. Queen Charlotte left the Queen's House for Frogmore; she died in 1818, and in 1823 the Queen's House was pulled down. The royal stables were built on the site in 1839. Meanwhile Wyatville had transformed the castle, under George IV., who came from his lodge in the Great Park to take up his residence in 1828. He died at the castle in 1830, his successor, William IV. in 1838, and the Prince Consort in 1861, all three, by a coincidence, in the same room. Many royal marriages have taken place in St George's Chapel. Prince Leopold, Duke of Albany, is buried in the Wolsey Chapel, and the tomb of the Duke of Clarence is in the same place, which has been magnificently decorated, and contains a cenotaph to the Prince Consort.

As we see it now Windsor Castle consists of an Upper and a Lower Ward, between which is the Mound and the Round Tower. In the Upper or eastern Ward are the Library, the state apartments, the Long Corridor, and the private apartments. Wyatville ingeniously connected all the isolated towers and the curtain wall between by means of this corridor, which is 520 feet in length. The state apartments contain many good pictures and other works of art. In the Lower Ward is St George's Chapel, with its cloisters, the Deanery, and the Canons' Houses. The last named contain remains of the palace of Henry III. Adjoining to the westward are the Horseshoe Cloisters, which contain the houses of members of the choir. Next to them are the barracks, including the Curfew



Windsor Castle.

Tower, built by Salvin. On the south side is the principal gate, called after Henry VIII. In a line with it are the houses of the Military Knights, a band of pensioners. The Round Tower is the residence of the constable, and from it floats the royal standard. Wyatville lived, till his death in 1840, in the Winchester Tower, called after William of Wykeham. Wyatville made Windsor what it is, and, though we may find fault with his details, his proportions and his eye for a grand scenic effect place him far ahead of any other architect of the so-called Gothic revival.

The town of New Windsor was chartered by Edward I. It contains some interesting old houses, but nothing that can with certainty be dated back to the time of Shakespeare, whose *Merry Wives of Windsor* is said to have been written for Queen Elizabeth. Sir C. Wren, who was M.P. for the borough in the Convention Parliament which elected William and Mary, built the town-hall in the market-place. The town is pleasantly situated close to the Home Park, and the famous Long Walk, an avenue of elms 3 miles long, which leads to the Great Park. East of the Long Walk are the tombs of the Duchess of Kent and of the Prince Consort, in domed chapels; also Frogmore, the royal gardens, the farm and the dairy. The Great Park contains a church, Cumberland Lodge, and Virginia Water (q.v.), which is nearly 5 miles from the castle. The number of Windsor's parliamentary members was reduced from two to one in 1867. Tapestry works established here in 1872 succumbed in 1888. Pop. (1851) 9596; (1891) 12,327.

See Tighe and Davis, *Annals of Windsor* (1848); G. M. Hughes, *History of Windsor Forest* (1890); and *Windsor Castle*, by the present writer (3d ed. 1891).

Windthorst, LUDWIG (1812–91), Catholic politician, was born near Osnabruck, and became distinguished as advocate and politician in Hanover. After the absorption of Hanover by Prussia, he became leader of the Ultramontanes in the German parliament, and chief opponent of Bismarck during the Kulturkampf (see GERMANY, p. 185).

Windward Islands, a group in the West Indies (q.v.) comprising St Lucia (the largest), St Vincent, Barbadoes, Grenada, and Tobago.

Wine, the fermented juice of the grape, is a highly complex liquid, whose proximate constituents are exceedingly liable to change. The juice, technically termed 'must,' as obtained by pressure from the grapes, is a somewhat viscid fluid, having a strong tendency to spontaneous fermentation when exposed to the heat of the sun. The must consists chiefly of water holding in solution, or suspended in exceedingly minute division, grape-sugar (*dextro-glucose* and *levo-glucose*), pectin, gum, dextrine, fat, wax, albumen, gluten; an indefinite series of compounds termed *extractives;* tartaric acid, both free and combined with potassium, as potassium bitartrate (cream of tartar) and other earthy bases. Racemic and malic acids

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are also in general present, likewise traces of one or more of the following—magnesia, the oxides of iron and manganese, potassium sulphate, calcium phosphate, common salt, and silica. The juice having fermented and become wine consists (prior to doctoring, plastering, &c.), as before, chiefly of *water*, in which, however, are now held in solution or suspension various alcohols (chiefly *ethylic*), several compound ethers, and tartaric, racemic, malic, succinic, glycolic, oxalic, acetic, and tannic acids (*tannin*). It also contains (before sophistication) glycerine, trace of acetaldehyde and of butyric, propionic, and œnanthic acids. Cane-sugar is said to be absent in all natural wines; it is, however, added in the manufacture of Champagne and in certain other cases of wine-making. The colouring matter and the tannin of the red wines are undoubtedly largely imported into them from the skins and the grape-stones during fermentation. The tannin and the various acids are supposed to exert a preservative influence on the wine. In normally coloured wine the oxidation of the œnotannin of the seeds, stalks, and husks, and of the *extractives* of the juice, contributes largely to the result.

The *Bouquet*, or peculiar aromatic odour of wines, is dependent on one or other of the compound ethers—aceto-propylic, butylic, amylic, caprylic, buto-ethylic, caprylo-ethylic, capro-ethylic, pelargo-ethylic, tannic, or other ether. The *bouquet* of wines, according to Rommer's experiments, is said to pass with the yeast from one wine to another, that is if the ferment from the must of one district be made to set up the fermentation of must derived, say from the Champagne, Côte d'Or, or other celebrated districts; in each case the wine had the bouquet of the vintage from which the special ferment was taken. The general *vinous odour*, common to all wines, is supposed to be due to the presence of *œnanthic ether*. The character of the wine, however, largely depends on both soil and climate. Thus a certain variety of grape grown on the Rhine gives a species of Hock; the same grape raised in the valley of the Tagus yields Bucellas; while in the island of Madeira it gives a wine known as Sercial, of entirely different flavour from either. The quantity of sugar in grape-juice varies extremely. In the juice of very ripe grapes it may reach 40 per cent. According to Fontenelle, the juice produced in the south of France contains from 18 to 30 per cent.; while in the neighbourhood of Stuttgart Reuss determines it at from 13 to 25 per cent. In the low and variable temperature of Holland, the juice of the best grapes yields only 10 or 12 per cent. of sugar. The composition of the albuminous matter is not clearly determined. It probably varies at from 1 to ½ per cent., and equals in weight only about $\frac{1}{20}$th of the sugar present.

The saccharin contents of grape-juice range from 13 to 30 per cent. If we regard all this sugar as grape-sugar, $C_6H_{12}O_6$, with a molecular weight of 180 (and it is from this sugar the alcohol, the essential constituent of wine, is derived), then each molecule of *grape-sugar* may be resolved, in the act of fermentation, into two molecules of *alcohol*, C_2H_6O, whose molecular weight is 92, and 2 molecules of *carbon dioxide*, CO_2, whose molecular weight is 44, according to the equation—

$$\overbrace{C_6H_{12}O_6}^{\text{Grape-sugar (180).}} = \overbrace{2(C_2H_6O)}^{\text{Alcohol (2 x 46).}} + \overbrace{2CO_2}^{\text{Carbon Dioxide (2 x 44).}}$$

provided that there is no loss; that is, under the most favourable conditions of fermentation, 180 parts (by weight) of grape-sugar (with the symbol $C_6H_{12}O_6$) may yield 92 parts of alcohol; or, roughly speaking, 2 parts by weight of sugar yield 1 of alcohol. From this, says Mulder, 'the juice of French and German grapes gives, when analysed, as a maximum, from 7 to 15 per cent. of alcohol by weight.'

According to Mulder, sugar is found in all wine, and its quantity depends to a considerable extent upon the treatment to which the grapes are subjected before pressure. Dr Bence Jones, in the appendix to his translation of Mulder's work, however declares, on the other hand, that, while Port, Sherry (except in two instances), Madeira, and Champagne always contained sugar, Claret, Burgundy, Rhine, and Moselle wine (excepting one sample of Sauterne) were always free from every kind of sugar. Tokay wine, for example, is prepared from grapes which have been allowed not only to get over-ripe, but partly to dry on the vines; *vin de paille* is obtained from grapes dried on straw exposed to the sun; and in both these cases water is evaporated, and the concentrated juice yields a wine of extra strength. The strong heavy wines used by the ancients were thus prepared.

In consequence of the close connection which exists between the amount of sugar in the grape-juice and the strength and excellence of the wine which it yields, extraneous sugar is introduced into the juice, so as to *doctor* it. For this purpose a cheap fermentable sugar is added to the sour juice, an adulteration which cannot subsequently be detected by chemistry. Many imitations of port wine are thus manufactured. If fermentation goes on till all the sugar is converted into alcohol a *dry* wine is produced; when it is checked before the change is completed a rich *fruity* wine is produced. Wines are thus divided into *dry* and *sweet* or *fruity* wines. When wine is bottled whilst the fermentation is still in progress *effervescent* wine is formed.

Shortly after the must has passed from the wine-press symptoms of fermentation appear; the juice becomes more turbid, bubbles rise to the surface, and a froth soon settles there. This process in a moderate climate usually reaches its highest point in three or four days; before it is quite finished the whole liquid mass is stirred up, so as to re-excite the process. For this purpose, in many districts, a naked man used to go into the wine-tub, who both accomplished the necessary stirring, and promoted fermentation by his animal heat. In two or three weeks the fluid becomes comparatively clear, and a precipitate accumulates at the bottom of the vessel. The wine is now removed from the sediment into another vessel, and a slow form of fermentation—*after-fermentation*, as it is termed—goes on for several months, *sugar* being constantly converted into *alcohol* and *carbon dioxide*, a fresh precipitate collecting at the bottom of the vessel as before. Several similar changes into other vessels are made, to get rid of the sediment, till it is fit for transferring into casks. That the process of fermentation may go on satisfactorily not only must water, sugar, and a nitrogenous matter in a state of actual change be present, but there must be a certain temperature and a certain amount of atmospheric air present. 'Although,' says Mulder, 'there is a wide interval between the extremes of temperature at which fermentation is possible, the boundary is very narrow which limits good and active fermentation in every kind of wine. The grapes of each country ripened under different degrees of summer warmth, and very unequally rich in constituents, require very different temperatures during fermentation; and different temperatures are also required for grapes which are the product of a warmer or a colder summer. But on these points we have little accurate knowledge.

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All we know is that a high temperature during autumn promotes fermentation, and a low one is detrimental to it; and that *inequality* of temperature during fermentation is extremely injurious, and not unfrequently spoils the wine altogether.' To what extent it is expedient to admit atmospheric air to the must, so that the fermentation may go on most favourably, is a point which is not even yet definitely settled.

The actual organism—*ferment*—which causes the breaking-up of the grape-sugar of the grape-juice into alcohol and carbon dioxide is, according to Pasteur, the *Mycoderma vini*. It is always, normally, found in the *bloom* on the surface of the grape, and much resembles in structure and action the *Torula* of fermenting wort. It is from this circumstance that grape-juice at proper temperatures will ferment. Of itself, according to Engel, one cell of *Mycoderma vini* will in forty-eight hours produce 35,378 cells.

The leading points in which the constituents of grape-juice and those of wine differ from one another in consequence of fermentation are that in the wine there is a diminution (1) of the mucilaginous and saccharin matters, in consequence of the formation of ferment and alcohol; (2) of those substances which are insoluble in common water, but are held in solution in the viscid must, as, for example, calcium and magnesium tartrate; and (3) of cream of tartar and potassium sulphate, which, being less soluble in spirit than in water, fall as the formation of alcohol increases. Red wines lose a portion of colouring matter and of the tannin, which is withdrawn by these salts, and hence become of a lighter colour and less astringent.

The process of *fining* or *clearing* is undertaken with the view of removing all the sediment in which albuminous matters may still occur, and of diminishing the colouring matter and tannin of red wines. Amongst the substances used for these purposes may be mentioned albumen (white of egg), isinglass, gum, milk, lime, gypsum, &c. In warm countries gum is preferable to albumen or isinglass. The addition of lime throws down a precipitate of salts of lime, which carries down, in the case of red wine, a considerable quantity of colouring matter; its addition gives a sweeter and less astringent taste to the wine, and an appearance of age. As a general rule clearing increases the durability of wine. *Sulphurising* is a process which is especially applied to sweet white wines, which possess an excess of sugar and albuminous matter, and little tannic acid, and thus become easily decomposed. Its object is to check undue fermentation, and to prevent the formation of mould, which afterwards imparts a musty taste to the wine. The process is effected by burning sulphur (which should be free from arsenic) in bottles or casks, and instantly pouring in the wine, which absorbs the sulphur dioxide (converted by absorption into sulphurous acid). Wine intended for exportation to warm climates is usually strongly sulphurised.

The ages at which different wines attain their perfection are, as is well known, extremely different. 'As a general rule,' says Mulder, 'wines which have retained a considerable portion of albuminous matter, and possess but little tannic acid, cannot resist the influence of time; they become acid, or undergo some other change. This occurs in the case of Rhine wines, which contain but little alcohol; and all those wines which contain much sugar, or but little tannic acid, cannot be kept long. Wines which can be *cellared* are those which improve; or, to speak more correctly, those wines are stored which improve with age. In these odoriferous substances are formed, and the wine becomes less acid and better tasted. Such wine as is coloured often deposits a considerable amount of sediment; and if it be stored in casks there is a constant increase of alcohol.' Wine is improved by being kept in wooden casks, as water escapes by evaporation, and the other constituents are relatively increased. The vinous constituents being thus concentrated exert a stronger chemical action upon each other, and render the wine not only stronger, but better flavoured. The change, however, does not stop here. The loss of water must be replaced by the addition of wine, otherwise the action of the air would turn the wine sour, and convert the alcohol into acetic acid; and the diminution of water, which is thus replaced by wine, causes a constant increase of tartaric acid. Wines which are poor in sugar may thus soon become too sour; and consequently all wines cannot undergo this process. The popular idea that wine which has grown old in bottles has therefore become richer in alcohol is altogether false, and is doubtless founded on the fact that it is only the strongest wines that can be preserved. The colour, however, of bottled wine is materially affected by age, liqueur-wines and red wines containing no large amount of tannic acid becoming darker, while wines which are rich in tannic acid, as port wine, for example, deposit a sediment, and become lighter. *Old* bottled wines contain odoriferous constituents—ethers of various organic acids—which are not found in *new* wine. This effect of time may, however, be imitated by art—by *Pasteuring* the wine. Pasteur first showed that for the due preservation of wine it was necessary to kill the *microbes* whose presence was deleterious to it; he also showed that a temperature of 60° C. (140° F.) in the presence of the alcohol in the wine, the wine being shut out of contact with the air, was sufficient to accomplish this object. But it was afterwards found that not only was the wine thus treated preserved from spontaneous deterioration, but that it had acquired much of the flavour, aroma, and other qualities characteristic of good old (*matured*) wine. This process should naturally much lessen the cost of 'old' wine. If bottles corked, but not quite filled with wine, are placed for two hours in warm water at a temperature of 185° F., and after cooling are filled, their contents will be found to have acquired the flavour and aroma of wine that has been bottled several years. Wines which have been long in bottle sometimes acquire a peculiar flavour, which is incorrectly referred to the cork. It is in reality due to the peculiar mould which grows from the outside of the cork inwards; and should it reach the inner surface it imparts to the contents of the bottle a peculiar taste; and this wine is said to be *corked*. Very similar to this is what is known as 'the taste of the cask,' a peculiar flavour sometimes acquired by wine before bottling. This flavour is regarded as dependent on the development of a peculiar essential oil, during the growth of 'mould,' on the surface of the wine. It can be removed by the addition to each pipe of about a quart of olive-oil, which dissolves the unpleasant flavouring matter, and carries it to the surface.

Colouring, Doctoring, and Plastering of Wine.—Our limits prevent our even giving a list of the adulterants used in colouring wines, including such innocuous substances as mulberries, bilberries, &c., and terminating in such poisonous substances as magenta and other aniline or coal-tar colours. All good natural wines tend to become turbid, both as they age and with change of temperature. To prevent this *gypsum* (plaster of Paris, or calcium sulphate) is used. The chief cause of the turbidity of bottled wine is potassium bitartrate; the plaster of Paris removes this, leaving in its place acid

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potassium sulphate with a little free sulphuric acid. These give a peculiar dryness to wines, much admired by connoisseurs, who neither know its source nor are aware of the tendency to gouty diseases it may encourage or induce.

Bence Jones gives the following table showing the percentage of alcohol in the best-known wines:

	Per cent.		Per cent.
Port	20·7 to 23·2	Burgundy	10·1 to 13·2
Madeira	19·0 „ 19·7	Rhine Wine	9·5 „ 13·0
Sherry	15·4 „ 24·7	Claret	9·1 „ 11·1
Champagne	14·1 „ 14·8	Moselle	8·7 „ 9·4

while there was in

Brandy	50·4 to 53·8	Bitter Ale	6·6 „ 12·8
Rum	72·0 „ 77·1	Porter	6·5 „ 7·9
Geneva	49·4	Cider	5·4 „ 7·5

Sugar is found (with but rare exceptions) in all wines, although in certain kinds very little exists. In red Bordeaux very little sugar is found; red Sauterne contains less than 1 per cent. of extract, and Hermitage 1·7; hence the quantity of sugar must be very minute; while some kinds of Muscat yield 24·5 of an extract, containing about 22 per cent. of sugar. Good red wines should contain at least ½ per cent. of sugar. Some of the sweet wines contain nearly one-fourth of their weight of saccharin matter. Bence Jones found that in

Sherry (18 samples),	sugar in 1 oz.	varied from	4 to 18	grains.
Madeira (9 samples),	„	„	6 „ 20	„
Champagne (4 samples),	„	„	6 „ 28	„
Port (8 samples),	„	„	16 „ 34	„
Malmsey Madeira,	„	„	56 „ 66	„
Tokay,	„	„	74	„
Cyprus,	„	„	102	„

Under the term 'free acids' are included the acid potassium tartrate, known as cream of tartar, and other soluble bitartrates found in wine, besides such acids as are quite uncombined. Sugar has so much power in concealing the free acids that their amount cannot be estimated with any certainty by the flavour of the wine, and must therefore be estimated by ordinary chemical methods. Traces of tannic acid may be found in all white wines, but in no white wine is it sufficiently abundant to be of the slightest importance in a medical or dietetic point of view. On the other hand, it is abundant in Port and heavily loaded Bordeaux wines, especially when new. In the course of time this tannic acid becomes oxidised into a sparingly soluble compound, which is called by Berzelius the *apothema*, or precipitate of tannic acid—a process which is facilitated by the exposure of the wine in bottles to full daylight. There is no doubt that this acid, by combining with the albuminous matters, tends to increase the durability of these wines. Bence Jones holds that 'proceeding from the least acid wine to the most acid, we have Sherry, Port, Champagne, Claret, Madeira, Burgundy, Rhine wine, Moselle.'

The recent decline in French vintages by reason of the Phylloxera has developed a new wine-making industry in France. Enormous quantities of dried raisins are imported, mainly from Smyrna and the East, are soaked in water for forty or fifty hours, and then treated as fresh grapes, yielding a harmless white or straw-coloured wine.

Diseases of Wine.—(1) *Turning* is incidental to young wine, and seems to occur under special conditions of the weather. The colour becomes darker, and the taste first disappears, and if the disease goes on becomes disagreeable; the wine becomes turbid and acid. This disease is caused by a decomposition of tartar. (2) *Ropiness* consists in the formation of a sort of vegetable mucus from the sugar of the wine, and is known as *viscous* or *mannitic* fermentation, due, according to Pasteur, to a special microbe. The wines liable to this change are those which are deficient in tannic acid. (3) *Bitterness*—to which Burgundy wines are especially exposed—seems due to a second fermentation, inasmuch as a large amount of carbon dioxide is evolved; it has been ascribed to the formation of citric ether. The disease is caused by the sediment, and often ceases on the wine being drawn off into other casks. (4) *Acidifying* depends upon the conversion of the alcohol into acetic acid, and may be stopped at its commencement by adding alkaline carbonates, which, however, destroy the colour and affect the taste of the wine. This acidification is due to a special microbe. (5) *Mouldiness* is a disease in which mould-plants are produced on the surface of the wine; the admission of air is favourable to the disease.

Manufacture.—The mode of manufacturing wine varies in its details in different countries. Pagnierre, in his treatise *On the Wines of Bordeaux*, gives the following description of the manufacture of the superior Clarets. The grapes, after being gathered, are picked, all that are likely to injure the quality of the wine being carefully removed. A principal vat of the best fruit, which is called the mother-cask (*cuve-mère*), is then made, into which, after picking, the workmen continue to put the best grapes, without their stalks, and without treading them, till they are from 15 to 20 inches deep; after which they throw about two gallons of old Cognac or Armagnac upon them, and then another bed of picked grapes, followed by two gallons more of brandy, and so on till the vat is full. Spirit of wine is then added, about four gallons being used for a wine-vat of from thirty to thirty-six tuns. The amount of brandy and spirits that is added varies with the quality of the vintage, the better vintages requiring the less spirit. When there is a deficiency of saccharin matter in the grapes starch-sugar is sometimes added. The *cuve-mère* when filled is closed and well covered with blankets to prevent the entrance of air, and is left in this state for about a month. A small cock or tap is placed in the side of the vat at about a third of its depth from the bottom, in order to allow of the progress of fermentation being observed, and to enable the manufacturer to know when the wine, having become cool and sufficiently clear, may be racked off and put into casks, previously prepared by scalding and rinsing with a little spirit. While the *cuve-mère* is at work the ordinary vintage goes on as follows: The grapes are trodden or acted on by machinery in the press, and put with their stalks into the vats, when the fermentation takes place naturally. About a foot of the upper part of the vat is not filled, in order to leave space for the fermentation, which in very mature vintages sometimes occasions an overflow of these limits. The term *chapeau* is applied to the floating mass of stalks, seeds, and skins on the surface. The vats are lightly covered, and in from a week to a fortnight the wine is ready for being drawn off; for if it is left upon the lees (*marre*), or in contact with its crust (*chapeau*), it would take the disagreeable taste of the stalks. The barrels in which it is then placed are filled to about two-thirds or three-fourths, after which the *cuve-mère* is emptied, and its wine is poured in equal portions into these casks so as to fill them; and the remainder is used to replace every week what is lost by evaporation, or may have leaked away. All proprietors have not the means of making a *cuve-mère;* but in its absence, and with the employment of small vessels, wine of an inferior character is produced. The casks being full are left unbunged for about a week, the bung-hole being in the meantime covered with a brick or piece of wood. They are filled up every two days, and after bunging at least once a week, till the wine is in a state to allow the cask to rest with the bung-hole at the side, which is not till after a year and a half.

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White wines are made in a somewhat different manner. The grapes are not, as in making red wine, put into the vat to ferment, but after the removal of the stalks they are trodden, and when taken from the press the juice, skins, and seeds are put into casks, in which the fermentation takes place, and wine is formed. When the fermentation has ceased the wine is racked off from the barrels into smaller casks; and any loss from evaporation is replaced once or twice a week.

The wine-presses of the Jews consisted of two receptacles, or vats, placed at different elevations, in the upper one of which the grapes were trodden, while the lower one received the expressed juice or must (see Joel, iii. 13). These vats were usually hewn out of the solid rock (Isa. v. 2 [margin], and Matt. xxi. 33). The ancient Egyptian wine-press was also thus composed of two vats or receptacles; and old Egyptian pictures showing the process of treading are familiar from such books as Wilkinson's *Ancient Egyptians*. A certain amount of juice was allowed to exude from the ripe fruit by its own pressure before the treading began. This was kept separate from the rest of the juice, and formed the *gleucos*, or 'sweet wine' noticed in Acts, ii. 13. Although the ancient system of treading the grapes still prevails in many countries, it is being gradually displaced by various mechanical appliances. In some parts of France two wooden cylinders turning in opposite directions are employed to crush the fruit; and more complicated presses are also in use.

Commerce.—The manufacture of wine has been carried on in all countries where the grape could be successfully cultivated from the very earliest periods of history; and during more recent periods it has followed the footsteps of man, and become established in the American and Australian continents. For the progress of viticulture in the United States, see VINE. The vine, like most cultivated plants, is capable of producing very numerous varieties, and these, of course, give rise to different qualities of wine; but far more influence is exerted upon the quality of the wine by climate, soil, and the position of the vineyard as to the sun's influence; so that we not only have wines peculiar to particular countries, but of those, again, we have usually very numerous varieties, produced by special causes within those countries; and in addition to all these, again, we have other differences, produced by the degrees of skill in the manufacture. The earliest wines of which we have any account were made in Asia. We find abundant evidence of the high esteem in which wine was held by the Greeks, Romans, and other civilised contemporary nations; and the name of one of the choicest Roman wines has continued in use till the present time—Falernian. From what we learn from Pliny and other writers regarding the extraneous additions made by the Romans to their grape-juice, and the treatment of the interior of their casks, we should much doubt whether even Falernian would be appreciated by the modern palate. The mediæval history of wine is involved in much obscurity. Though we find abundant mention of Sack and Canary, the Greek islands seem to have furnished a large portion of the wine then consumed in Europe, and the merchant-ships of Venice in the days of her glory appear to have been largely engaged in carrying Greek and Italian wines. The Malmsey of those times was not the produce of Madeira, but of the islands of Tenedos, Lesbos, Chio, and Crete.

Burgundy is the oldest wine-producing country of central Europe, and centuries ago the wine of this province was the choicest to be found on the tables of the rich and noble. Much of the Burgundy of the present day has excellent qualities—being of good body, velvety, and of delicate bouquet. A few scarce kinds, such as the Romanée-Conti, are really splendid wines. Claret or red wine, for the English market, is chiefly the produce of the Medoc district. It begins below Bordeaux, on the left bank of the Gironde, and stretches almost to the Bay of Biscay. White wine, or Sauterne, is also produced in the same neighbourhood. The general character of the Bordeaux wines, which are of all qualities, is crispness, elegance, and fine bouquet, and they improve by keeping. Sparkling wine of great renown is produced in the Champagne, the finest qualities of which sell at exorbitant prices.

Germany produces fine white but very few red wines. They are best known in the British market as Hocks and Moselles, and are made both still and sparkling. At the Vienna Exhibition of 1873 the jurors on the wine section had before them a sample of Rhine wine made in 1706, the year in which Marlborough gained the battle of Ramillies, another coeval with the war of American independence, and another of the year of the battle of Jena. But all these and others made in the early part of the century, before the days of 'fortifying,' had lost their characteristic taste and flavour, and were but the phantoms of what they had been.

The vineyards of Austria produce a great variety of wines, which are mostly consumed in the country itself. Hungary is still more a wine-growing country, producing considerably more than it consumes, and is the home of the renowned Tokay (q.v.), which boasts a high antiquity, and commands a fabulous price. Méneser-Ausbruch, Carlowitz, Ruster, Somlauer, and others are also favourably known, but the long land-carriage is a serious check on the trade with England.

The best Spanish sherries are those technically called *dry*—that is, free from sweetness. Manzanilla is said to be the purest, but Montilla, Amontillado, and Vino de Pasto are also famous kinds of sherry. This wine is chiefly shipped at Cadiz, near which it is made. The Malaga wines, both sweet and dry, are widely known, and from Catalonia come what are known in England as the Spanish Reds, one of them being Tent, dark and sweet, and much used as sacramental wine. Port wine (q.v.) is mostly brought from Oporto.

Italy, with great natural advantages and large home production, is behind several other nations in the manufacture and exportation of fine and especially of sparkling wines; but the Barolo of Piedmont, the Chianti of Tuscany, the Orvieto of the Roman States, the Lacryma Christi of Naples, and other special growths have a high reputation. Marsala, a wine with a sherry-like flavour, comes from Sicily. The lesser wine-growing countries of Europe are Switzerland, Russia, Turkey, and Greece, which continues as in ancient times to put resin in what is required for home consumption. The wines of Shiraz in Persia are still most excellent, and sometimes find their way to England. Australia already astonishes the best French judges by the excellence of her wines, and the Cape continues to yield her luscious Constantia and other growths of fine quality.

The boiled juice of the grape, also the water-infusion of dried raisins, have been termed *unfermented wines*. Some wine merchants supply what they designate *unfermented wine*, containing only enough alcohol (mixed with it) to preserve it, as *sacramental wine;* while other importers describe this same wine as being only *slightly* fermented, up to the point of generating the amount of alcohol necessary to its preservation. *British wines*, as gooseberry, damson, elder-berry, apricot, cherry, parsnip, and other wines, consist of the fermented juices of the fruit or roots from which they derive

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their respective names. Before being subjected to fermentation they are largely mixed with sugar. The general processes in the manufacture of British wines closely resemble those which have been just described.

The imports of wine into the United Kingdom vary from about 15,000,000 to nearly 20,000,000 gallons; in an average year, as 1891, the 17,008,000 gallons imported have a value of about £6,000,000. In the same year the United States, in addition to about 25,000,000 gallons made at home (considerably more than half in California), imported 3,860,000 gallons in cask and 750,000 dozen bottles, of a total value of upwards of $10,000,000. In the same year the United States exported 11,679 dozen bottles and 543,192 gallons of wine in cask (total value, $371,500). Of European countries Italy grows most wine, Spain exports most, but the export of France (about 56,000,000 gallons annually) has a higher value than that of Spain. Austria-Hungary produces about a third of the French produce (which latter amounts to over 600,000,000 gallons).

With respect to the high prices realised by old wines of famous vintages, we may state that as much as £2 per bottle has occasionally been given for Port and Tokay; and two bottles of old Burgundy have been sold in England at the very extraordinary price of £80 each.

Dietetic and Medical Value of Wines.—It may be laid down as a general rule that the use of wine, even in moderate quantity, is not only not necessary, but absolutely undesirable for young or adult persons enjoying good ordinary health. As, however, life advances, and the circulation becomes languid, wine in moderation becomes, in the opinion of some medical writers, a valuable article of food; and even in earlier life the physician meets large numbers of townspeople, especially women engaged in sedentary occupations, who cannot digest beer. In such cases the beer is replaced by the more grateful beverage, tea, which, however, when taken too freely, and without sufficient solid food, gives rise to a form of distressing dyspepsia, which too often impels the sufferer to seek refuge in spirits. In many such cases cheap wine, which may be purchased at from 1s. 6d. to 2s. a bottle, mixed with an equal bulk of water, will be found an excellent substitute for the beer or tea. The vast quantities, says Mr Williams, of brilliantly-coloured liquid flavoured with orris-root, which would not be allowed to pass the barriers of Paris, but must go somewhere, is drunk in England at a cost of four times as much as a Frenchman pays for genuine wine (see Williams, *Chemistry of Cookery*, p. 285). 'The distinctive elements of wine,' says Dr Druitt, 'are to be had in abundance in cheap Bordeaux, Burgundy, and other French wines; in Rhine wine; in the Hungarian, Austrian, and some Greek wine; and in all with a natural and not injurious quantity of spirit. In prescribing *pure wine*—i.e. light natural, virgin wine—the practitioner has a perfectly new article of both diet and medicine in his hands.' In cases of debility and indigestion such wine as that which we are now considering, diluted with cold water, may often be freely prescribed with great advantage in place of tea at breakfast, as well as at luncheon and dinner, or dinner and supper, according as the patient arranges his meals. The best of the cheap wines are those of Bordeaux; they are pure, light, and exhilarating; moderately strong, seldom containing 20 per cent. of alcohol; free from sugar and other materials likely to induce gout or headache. The Burgundy wines are fuller, stouter (on an average from 2 to 4 per cent. stronger in alcohol), and higher flavoured than the Bordeaux of equal price. Some of the Hungarian wines are excellent substitutes for Bordeaux, and, not having the acidity, austerity, and coldness of the latter, are often preferred by patients. Amongst the most important of the *dearer* kinds of wine are Port, Sherry, and Champagne. Good old Port, now very difficult to obtain, is often recommended as a tonic of great value in cases of fever and other forms of extreme debility; but many persons past forty dare not take it if they have any predisposition to gout. Sherry is in general use, and is the only wine admitted into the British Pharmacopœia, in which it is employed in the composition of aloetic, antimonial, colchicum, and other medicated wines.

See Henderson's *History of Ancient and Modern Wines;* Bence Jones's translation of Mulder's *Chemistry of Wine;* Payen's *Industrial Chemistry,* translated by Dr Paull; Druitt's *Cheap Wines;* Thudichum and Dupré, *Origin, Nature, and Varieties of Wine;* Cyrus Redding, *History and Description of Wines;* on American wines and wine-growing, works by Hasmann, Staraszthy, Hyatt, and Rixford; *The Wine Manufacturers' Handbook,* edited by Gardner; Health Exhibition manual on the *Æsthetic Use of Wine* (Thudichum); Muspratt's Chemistry applied to the *Arts and Manufactures; Chemistry of Cookery,* by W. Mattieu Williams, pp. 269–293; *Analyse des Vins,* by Dr L. Magnier de la Source; *Il Vino* (Florence, 1881), by Professor A. Graf and others; the works of Shaw and Denman, in English; those of Julien, Chaptal, Fauré, and Batilliat, in French; those of Ritter, Balling, Von Babo, Bronner, &c., in German; the chief works on technological chemistry, as Wagner's, in all languages; and the articles VINE, ALCOHOL, BORDEAUX, BURGUNDY WINES, CANARY, CHAMPAGNE, FERMENTATION, HOCHHEIM, MADEIRA, MALMSEY, PIPE, PORT WINE, SACK, SHERRY, &c. in this work. For arguments as to the wine of Scripture, see TEMPERANCE, and works there cited; also Dr F. R. Lees's *Science Temperance Handbook* (vol. viii.).

Winer, GEORG BENEDIKT, a great New Testament scholar, was born at Leipzig, 13th April 1789, studied there, and in due time became *privat-docent* and professor extra-ordinary in Theology. He was called to a chair at Erlangen in 1823, but returned as ordinary professor to Leipzig in 1832, and died there, 12th March 1858. Of his numerous works first in importance stands his invaluable and still unequalled *Grammatik des Neutestamentlichen Sprachidioms* (1821; 7th ed. by Lünemann, 1867). No less admirable are his *Biblisches Realwörterbuch* (1820; 3d ed. 2 vols. 1847–48), a storehouse of sound learning and sagacity, and the invaluable *Handbuch der theologischen Literatur* (1821; 3d ed. 2 vols. 1838–40; supplement, 1842). Winer also edited, with Engelhardt, the *Neue Kritische Journal der theologischen Literatur* (1824–30), and, unaided, the *Zeitschrift für wissenschaftliche Theologie* (1826–32).

Other works are the *Komparative Darstellung des Lehrbegriffes der verschiedenen Christlichen Kirchenparteien* (1824; 4th ed. by Dr Paul Ewald, 1882; Eng. trans. 1873); *Grammatik des biblischen und Targumischen Chaldäismus* (1824; 3d ed. by Fischer, 1882; Eng. trans. Andover, 1845). Winer's great grammar of New Testament Greek was translated into English by Moses Stuart and Edward Robinson (Andover, 1825), Agnew and Ebbeke (from 4th ed. Phila. 1839), Masson (from 6th ed. Edin. 1859), J. Henry Thayer (from 7th ed. Andover, 1869), and W. F. Moulton (Edin. 1870; 2d ed. 1877; 3d ed. 1882). See W. Schmidt, 'Zum Gedächtnis Dr G. B. Winers,' in the *Beiträge zur Sächsischen Kirchengeschichte* (1885).

Winfield, capital of Cowley county, Kansas, on Whitewater Creek, 247 miles by rail SW. of Kansas City. Pop. 5184.

Wings. See BIRDS, FLYING.

Winifred, ST, according to the legend, was a noble British maiden, whose head the prince Caradog cut off because she repelled his unholy proposals. The head rolled down a hill, and where

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it stopped a spring gushed forth—famous after as a place of pilgrimage, Holywell in Flintshire (see WELLS). The saint's head was replaced by St Beuno, and St Winifred survived the miracle fifteen years.—For Winfried, see BONIFACE.

Winkelried, ARNOLD VON. See SEMPACH.

Winnebago. See WISCONSIN.

Winnipeg, capital of the Canadian province of Manitoba, stands at the confluence of the Assiniboine with the Red River, by rail 1424 miles WNW. of Montreal and 512 miles NNW. of Minneapolis. Formerly known as Fort Garry, from the Hudson Bay Company's post so called (pop. in 1871, 241), it was incorporated as the city of Winnipeg in 1873. It is substantially built of stone and brick, with wide streets traversed by tramways and lit with the electric light. The principal buildings are the government offices, city hall, post-office, numerous churches, a fine hospital, and the buildings of the university of Manitoba, which includes an Episcopal, a Presbyterian, and a Roman Catholic college. The city contains great flour-mills and grain-elevators, the shops of the Canadian Pacific Railway, and a number of manufactories, and is the busy centre of a fertile country, with a large carrying trade both by river and rail. Pop. (1871) 241; (1881) 7985; (1891) 25,642.

Winnipeg, LAKE, in Manitoba, 40 miles N. of Winnipeg city, and 650 feet above sea-level, is 280 miles long, 57 miles broad, and has an area of 8500 sq. m. Its largest tributaries are the Saskatchewan (q.v.), the Winnipeg, and the Red River of the North (q.v.); its outlet is the Nelson River (q.v.).

Winona, capital of Winona county, Minnesota, on the right bank of the Mississippi (here crossed by an iron railroad bridge), 103 miles by rail SE. of St Paul. It contains a state normal school, a number of flour and saw mills, foundries, carriage, barrel, and sash and door factories, &c., and ships great quantities of wheat. Pop. (1880) 10,208; (1890) 18,208.

Winsey, or WINCEY, a cloth consisting of woollen warp and cotton weft, or of wool mixed with a portion of cotton. Heavy winseys are used for skirtings, light winsey for men's shirts. The word is believed to be shortened from *linsey-winsey*, a jingling modification of *linsey-woolsey*.

Winslow, EDWARD, governor of Plymouth colony, Massachusetts, was born in 1595 at Droitwich, sailed in the *Mayflower*, was either assistant-governor or governor from 1624, and thrice returned to England to describe the colony, or defend it against its accusers. He thus came to publish his *Good Newes from New England* (1624), *Hypocrisie Unmasked* (1646), and *New England's Salamander* (1647), all three valuable accounts of the young colony. Appointed by Cromwell chief commissioner of an expedition against the West Indies, he died at sea in 1655.—His son, JOSIAH (1629–80), was assistant-governor from 1657 to 1673, and then governor till his death. In 1675 he was chosen general-in-chief of the United Colonies; and under him the first public school was established in 1675.—His grandson, JOHN (1702–74), carried out, under orders, the removal of the Acadians (see ACADIA); and John Ancrum Winslow (1811–73), descendant of one of Edward Winslow's brothers, commanded the *Kearsarge* in her action with the *Alabama* (q.v.), and died an admiral.

Winsor, JUSTIN, born at Boston, Massachusetts, in 1831, studied at Harvard and at Heidelberg, was librarian at Boston 1868–77, and afterwards at Harvard, and has published various bibliographical works, and edited the *Memorial History of Boston* (4 vols. 1880–81), and a valuable but somewhat chaotic compilation, *The Narrative and Critical History of America* (8 vols. 1884–90). In 1891 he issued a Life of Columbus.

Winston, capital of Forsyth county, North Carolina, 218 miles SW. of Richmond, Virginia, with several tobacco-factories. Pop. (1880) 2854; (1890) 8018.

Wint, PETER DE, water-colourist, was born at Stone, Staffordshire, 21st January 1784, the son of a physician, sprung from a Dutch family settled in New York. He was trained to be a mezzotint engraver under J. R. Smith, but soon took to painting both in oil and water-colours, and his fame rests on his beautiful water-colour illustrations of English landscape, English architecture, and English country-life. Lincoln (where he found a wife), Yorkshire, and parts of Derbyshire were the regions he loved best; but he painted scenes on the Thames, the Trent, and in Wales and elsewhere. He exhibited mainly in the rooms of the Old Water-colour Society, and is well represented both in the National Gallery and at South Kensington. He died at London (where he had mostly lived), 30th June 1849. Among his most famous pictures are 'The Cricketers,' 'Lincoln Cathedral,' 'The Hay Harvest,' 'Nottingham,' 'Richmond Hill,' 'Cows in Water.' 'A Cornfield' and 'A Woody Landscape' are oils at South Kensington.

See the Memoir by Walter Armstrong (1888), and Redgrave's *David Cox and Peter de Wint* in the 'Great Artists' (1891).

Winter. See SEASONS, EARTH.

Winterberry, a name given to several shrubs of the genus Ilex, growing in the eastern parts of North America. *I. verticillata*, the Virginian Winterberry, has white flowers in clusters, and bright scarlet berries that remain after the fall of the leaf. The bark is astringent and tonic.

Winter-cherry, the *Physalis alkekengi*, one of the Solanaceæ, with edible red berries, also called in the United States Strawberry-tomatoes. *P. peruviana*, or Peruvian Gooseberry, has yellow berries. The name is given too in the United States to the *Cardiospermum halicacabum*, also called Balloon Vine, from the large, triangular, inflated fruit.

Wintergreen. See GAULTHERIA. The oil of wintergreen, named from this plant, is an aromatic stimulant, used chiefly in flavouring confectionery and syrups; and is now obtained from the sweet birch as frequently as from the wintergreen plant. The name is also given to plants of the genera Pyrola and Chimaphila, herbaceous or half-shrubby plants. The twenty species of Pyrola are found throughout the northern hemisphere, several species being natives of Britain; the species of Chimaphila, found in North America, are sometimes distinguished as spotted wintergreen. Both *Gaultheria procumbens* and a low-climbing plant, *Mitchella repens*, are called Checkerberry in the United States.

Winter's Bark, a stimulant, aromatic, and tonic bark, named from Captain Winter, who first brought it from the Strait of Magellan in 1579. It is the produce of *Drimys Winteri*, a native of some of the mountainous parts of South America, and abundant in the lower grounds of Cape Horn and Staten Island—a magnoliaceous evergreen shrub with laurel-like leaves and corymbs of white flowers. The Star Anise (Illicium) is nearly allied to it. The bark of other species of Drimys has properties similar to those of Winter's bark, as that of *D. Granatensis*, much used in Brazil, and of *D. axillaris*, a New Zealand tree.

Winterthur, a town of Switzerland, on the Eulach, 17 miles by rail NE. of Zurich, with thriving manufactures of locomotives, and of cotton,

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silk, and woollen goods, &c. It contains a good town-hall, industrial schools, a museum of Roman antiquities, and a public library of 20,000 vols. Pop. (1888) 15,956. The Roman *Vitodurum* (now Ober-Winterthur), it was held by the Counts of Kyburg (castle 4 miles off), and then by the Hapsburgs, who sold it to Zurich in 1467. See History by Troll (Vienna, 1842–43).

Winthrop Family.—JOHN, governor of the colony of Massachusetts, was born at Groton, near Hadleigh, in Suffolk, England, January 22, 1588, was bred to the law, appointed justice of peace at the age of eighteen, and on account of his excellent and pious character was in 1629 elected by the governor and company of Massachusetts Bay to govern their colony. He landed at Salem, with the colony's charter and a fleet of eleven ships, on June 22, 1630. He was re-elected governor every year until 1634. In 1636 he became deputy-governor under Sir Harry Vane, with whom he had an animated controversy on the doctrines of Mrs Hutchinson. In 1637 he was elected over Sir Harry, and continued governor, with a brief interval, during his life, and had more influence probably than any other man in forming the political institutions of the northern states of America. He died at Boston, March 26, 1649. Winthrop kept a careful journal, the first part of which was published in 1790, and the whole in 1825–26 (new ed. with additions, 1853). See his *Life and Letters*, by R. C. Winthrop (Bost. 1864–67).—JOHN, governor of Connecticut, eldest son of the preceding, was born at Groton, England, February 12, 1606; educated at Trinity College, Dublin; made the tour of Europe; went to America in 1631, and was chosen a magistrate in Massachusetts; in 1635 went to Connecticut and built a fort at the mouth of the Connecticut River, being governor of the colony for a year; and founded the city of New London in 1646, settling there in 1650. In 1657 he was elected governor, and, with the exception of one year, held that post till his death. He obtained from Charles II. a charter which united the colonies of Connecticut and New Haven, and was named first governor under it; and he was the father of the paper currency in America. He was a student and a scholar, a fellow of the Royal Society, a Puritan without bigotry, and just and even lenient to those of other religious opinions. He died at Boston, April 5, 1676.—His son, also JOHN, but known as Fitz-John (1639–1707), served under Monk and in the Indian wars, was agent in London for Connecticut (1693–97), and governor of the colony from 1698 till his death. See the *Winthrop Papers* (Mass. Hist. Soc., 1889).—JOHN, LL.D., American physicist, a descendant of the first Governor Winthrop, was born at Boston in 1714, graduated at Harvard in 1732, and in 1738 was appointed professor of Mathematics and Natural Philosophy there. In 1740 he observed the transit of Mercury, and in 1761 he went to Newfoundland to observe the second transit in the century. He published papers on earthquakes, comets, and other subjects, was a fellow of the Royal Society, and died May 3, 1779.—ROBERT CHARLES, LL.D., American orator, descendant of the sixth generation from the first Governor Winthrop, was born at Boston, May 12, 1809, graduated at Harvard in 1828, studied law with Daniel Webster, and was admitted to the bar in 1831, but soon abandoned law for politics, and was elected to the state legislature in 1834, where he served till 1840. He then was elected to congress, of which he was a member for ten years, and in 1847–49 was its speaker. In 1850 he succeeded Webster, who became Secretary of State, as senator from Massachusetts, but lost his seat in 1851; and in the same year he was also defeated as a candidate for governor of Massachusetts. He is most famous as a speaker on historical occasions (see his *Addresses and Speeches*, 4 vols. 1852–86), and has published, besides the Life of the first John Winthrop, a volume on *Washington, Bowdoin, and Franklin* (1876).

Winzet, NINIAN, was born at Renfrew in 1518. Of his parentage and early youth nothing is known. It is probable that he was educated at the university of Glasgow; and he was certainly ordained priest in 1540. About 1552 he was appointed master of the grammar-school at Linlithgow, where he also acted as a notary, and was eventually promoted to the provostry of the Collegiate Church of St Michael's. On the establishment of Protestantism in Scotland (1560) Winzet, who adhered to the old religion, was deprived of his various offices, and came to Edinburgh, where he received the countenance of Queen Mary. It was now that he wrote his pamphlets entitled *Certane Tractatis for Reformatioun of Doctryne and Maneris*, which have given him an honourable place among Scottish Catholics posterior to the Reformation. Forced to quit Scotland in 1563, he made his home in the university of Paris till 1571, when he was summoned to England to perform certain services to Mary who was now in captivity. Returning to Paris the same year, he became a teacher of some distinction in the university, holding thrice in succession the office of Procurator of the German Nation. In 1574 he removed to the English College of Douay, where he became licentiate in theology, and in 1577 his learning and various services to the church were rewarded by his appointment as Abbot of St James's, Ratisbon. In this office, which he discharged with characteristic energy and fidelity, he died in 1592.

See Irving, *Lives of Scottish Writers*, and Winzet's Works (1891), edited for the Scottish Text Society by the Rev. J. K. Hewison, who has brought together all that is known regarding Winzet and his writings.

Wire. Specimens of metallic shreds dating as far back as 1700 B.C. are stated to have been discovered; whilst a sample of wire made by the Ninevites about 800 B.C. is exhibited at the Kensington Museum, London. Mention of a similar product is made by both Homer and Pliny. Wire was originally made by beating metal into plates, which were cut into narrow strips, and subsequently rounded by hammering. The art of wire-drawing was not practised until the 14th century, or introduced into Great Britain till some three centuries later. The facility with which any metal can be drawn into wire depends upon its ductility. Most metals possess this property; though some, like bismuth and antimony, are so brittle that they can only be drawn out with difficulty, and wire made from such metals is useless from want of tenacity (see DUCTILITY). The general principle involved in the manufacture of wire consists in rolling down ingots or bars into rods of say ½ inch diameter, which are afterwards attenuated and reduced in section by being drawn cold through holes in metal plates or hard stones. The accompanying illustration represents a wire-drawer's bench, A being the draw-plate, and B the drawing-block or cylinder; driven by a prime mover through the gearing as shown. The draw-plate, A, is generally made of hard steel, the holes in it being funnel-shaped. Owing to the excessive friction generated, notwithstanding the use of lubricants, the holes rapidly wear away and enlarge. After being once drawn, the wire is again passed through a smaller hole in the draw-plate, and so the process is repeated until the required size is reached. Fine wire may require from twenty to thirty drawings. The speed of the drawing-cylinder is increased as the diameter of the wire diminishes. The metal under treatment gradually

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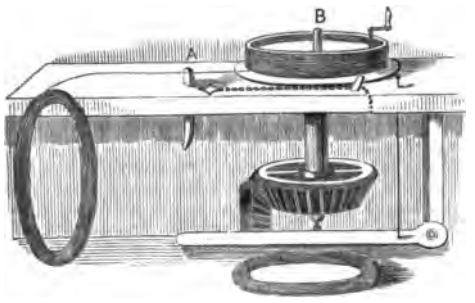
hardens, and becoming less ductile requires *annealing*, after which it is washed in an acid solution and subsequently steeped in lime-water. The ductility of the metal and the diameter of the wire determine the rapidity with which drawing can be



Wire-drawer's Bench.

effected. Iron and brass can be drawn at a speed of from 12 to 45 inches per second, gold and silver fine sections at from 60 to 70 inches per second. Where great accuracy is required, as in chronometer springs, and for gold and silver laces, platinum wire, &c., perforated rubies, or similar hard stones, are fitted to the draw-plate. A silver wire, 170 miles long and about $\frac{1}{1000}$ of an inch in diameter, has been drawn through a hole in a ruby, and found by a micrometer to be exactly the same size at the end as at the beginning; whereas the drawing of a length of 16 miles of brass wire through a steel draw-plate necessitates a readjustment of the hole.

Iron was formerly used to a considerable extent for wire, but has been largely superseded by steel. The ultimate tensile strength of steel wire ranges from 40 to 170 tons per square inch of sectional area. Wire gauges are, unfortunately, numerous, and apt to cause confusion. A treatise by Hughes in 1879 mentions no less than fifty-five different gauges, forty-five of which were for measuring or determining the sizes of wire manufactured and sold within the United Kingdom. In 1857 Sir Joseph Whitworth introduced his gauge, ranging from $\frac{1}{2}$ an inch to $\frac{1}{1000}$ of an inch by regular gradations of thousandths of an inch, No. 1 being ·001 of an inch, and No. 500 being ·500 of an inch. The Birmingham wire gauge had also extended application. In 1884 the imperial standard wire gauge, ranging from 7/0 = ·500 inches to 50 = ·001 inches, was mutually agreed upon as a much desired and uniform gauge, and became law.

The annual production of wire and wire products is enormous, the industry being chiefly seated in the United States (see, e.g., WORCESTER), Great Britain, Germany, and Belgium. The dimensions to which the trade has grown may be judged from the annual output—some 50,000 tons—of one of the leading continental firms. A bare enumeration of the many and varied purposes to which wire is applied, ranging from a pin to a 12-inch hawser, would form a formidable list; whilst each year witnesses its further extended employment in every branch of industry. The one item of barbed wire alone—a comparatively recent introduction for fencing purposes—represents an annual output in America and Europe estimated at over 100,000 tons. According to official returns, there are about 184,000 miles of telegraph wire in the overland service of Great Britain; whilst the Western Union Telegraph Co., U.S.A., have some 648,000 miles of wire in their system alone. With few exceptions pins are made of brass wire, and the production of these has been estimated at no less than 50 millions per day in Great Britain alone. Wire furnishes an interesting example of the increase in value of a raw material through the labour put upon it. Professor Babbage drew attention to the fact that one pound of iron, originally valued at twopence, would yield 50,000 hair-springs for watches, each weighing about one-seventh of a grain, and selling at a retail price of twopence apiece, or over £400 in all.

WIRE-ROPES are now extensively employed in many trades and industries, superseding hemp-ropes and chains. They seem to have originated in Germany about 1821, and in the suspension bridge at Geneva, built in 1822, ropes of parallel and untwisted wire, bound together on the 'selvagee' method, were employed. Some fifteen years later 'formed' or 'stranded' wire-ropes were manufactured and employed in the Harz mines. Formerly wire-ropes were made from high-class iron; but steel is now almost universally employed in their manufacture. Wire-ropes are stranded and laid or closed in machines differing only in detail from those employed for making ordinary hemp ropes, both vertical and horizontal types of revolving machine being used. In the manufacture of the heavier wire-ropes the great weights manipulated necessitate a correspondingly massive design of plant. A wire-rope 'strand' generally contains from six to nine wires, and never more than eighteen. A 'laid' rope consists of a heart (a strand either of hemp or wire), around which are twisted six strands containing a similar heart, usually covered with six wires. A 'formed' rope comprises six strands laid round a heart, but each strand consisting of eighteen wires in addition to the core. A 'cable laid' rope is composed of six laid ropes closed together to form one cable. Wire-ropes are generally galvanised to prevent rust, by being drawn through an alkaline or acid liquor, and thence through the galvanising bath of molten 'spelter,' any superfluous metal being removed from the ropes by their subsequent passage through a bed of sand. Judicious oiling at intervals reduces the cutting action of the wires against each other and lengthens the life of the rope. The applications of wire-ropes are almost numberless, and are constantly increasing. For winding and hauling purposes in mines, &c., wire-ropes are very largely used. The vertical winding ropes used in British mining operations commonly range from 3½ to 4½ inches in circumference; they are wound on drums from 20 to 30 feet in diameter and at speeds of from 2000 to 2500 feet per minute.

In the United States and Australia hundreds of miles of street and other railways are operated by wire-cable traction, whilst some British cities also possess cable tramways. For aerial ropeways wire-ropes are extensively and successfully employed in all parts of the world. Besides their permanent employment in suspension bridges, such as the Brooklyn Bridge (see BRIDGE, p. 445), wire-ropes furnish valuable aid in the erection of large bridges, and were largely used in connection with the Forth Bridge and the Sukkur Bridge across the Indus. In the first-named structure no less than 60 miles of wire-roping were temporarily employed. For marine, electrical, and kindred purposes, in addition to many others too numerous to detail, wire-ropes are very extensively used. The strength of the steel wire used for ropes ranges from 70 to over 100 tons per square inch of sectional area. To attain equal strength the weight of a hemp rope may be taken at about three times, and that of a chain at about five times the weight of a steel wire-rope. See J. Bucknall Smith, *Wire: its Manufacture and Uses* (1891).

Wire-worms, the grubs of click beetles (Elater or Agriotes), perhaps the most injurious of farm

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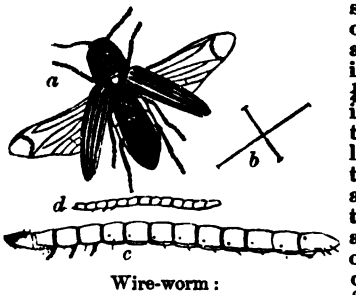
pests, destroying root, grain, and fodder crops. They are called wire-worms 'from their likeness in toughness and shape to a piece of wire;' they are yellowish in colour, from ¼ to ½ an inch in length, with three pairs of legs, and a suctorial appendage below the tail. The adults are skip-jack or click beetles common in the fields in summer-time. The eggs are laid near the roots of plants, in the ground or in the axils of basal leaves; the grub remains for several years (three to five) as such, burrowing in the ground during the frost of winter, but at other times hardly ceasing from voracious attacks on the roots and underground stems of all sorts of crops. Eventually they pupate in the soil, whence the adult beetle emerges. Common forms are *Agriotes obscurus*, *A. lineatus*, *A. sputator*. They are not to be confused with millipedes, which they slightly resemble. For prevention Miss Ormerod recommends lime-compost, guano and superphosphate, soot, nitrate of soda and salt, and other obnoxious dressings, summer fallow, and burning all rubbish, clod-crushing and heavy rolling. On a small scale slices of potatoes or turnips may be successfully used as traps. Among natural enemies of wire-worms moles, rooks, plovers, and pheasants are important.



Wire-worm:

a, perfect insect magnified; *b*, natural size of perfect insect; *c*, wire-worm magnified; *d*, natural size of wire-worm.

Wisbech, a market-town of Cambridgeshire, in the Isle of Ely, on the Nene, 21 miles ENE. of Peterborough, 13 SW. of Lynn, and 40 N. of Cambridge. The parish church, Norman to Perpendicular in style, has a fine tower; and there are a corn exchange (1811), a cattle-market (1869), a town-hall (1873), the Cambridgeshire hospital (1873), a museum and literary institute, and a public park of 18 acres. A castle, founded by the Conqueror in 1071, was rebuilt by Bishop Morton in 1483, restored by Bishop Andrews in 1617, and again rebuilt from Inigo Jones's designs by Thurloe, Cromwell's secretary, but was demolished in 1816. Visited by King John and Edward IV., it was the prison under Elizabeth of many Catholic recusants, including Bishops Wishart and Watson, the Jesuit Weston, Dr Bagshaw, Catesby, and Tresham (T. G. Law's *Conflicts between Jesuits and Seculars*, 1890). Godwin was a native, and Clarkson, to whose memory a Gothic cross by Sir G. G. Scott was erected in 1881. Vessels of nearly 500 tons can now ascend the Nene from the Wash, a distance of 7 miles; and Wisbech has a considerable export of cereals and import of timber, with some manufactures of iron, oil, ropes, &c. It was made a municipal borough in Edward VI.'s reign. Pop. (1851) 10,089; (1891) 9395.

See W. Watson's Historical Account of Wisbech (1827); History of Wisbech (1833); 'Wisbech Castle' in the *Journ. Brit. Arch. Assoc.* (1879); and Miller's *Fenland Past and Present* (1878).

Wisby, a once famous seaport on the west coast of the Swedish island of Gothland (q.v.), 130 miles S. of Stockholm. One of the most important commercial cities in Europe during the 10th and 11th centuries, during the 14th and 15th it was a principal factory of the Hanseatic League (q.v.). The eastern trade, which during the 11th and 12th centuries passed through Russia, and thence down the Baltic to Gothland, centred in Wisby, and greatly enriched that port. In 1361 Valdemar III. of Denmark took the town by storm, and, plundering it, obtained an immense booty. This was a fatal blow to the prosperity of the place. The architecture of Wisby is exceedingly interesting. Its ancient walls and towers exist in almost as entire a state as they were in the 13th century, and render its appearance, as seen from the sea, exceedingly striking. The early grandeur of the town is attested by the fact that it contains, well preserved, the remains of ten churches, all of which date from the 11th and 12th centuries, are varied in form and ornament, and are a mine of interest to the student of Early Gothic. The oldest is the church of the Holy Ghost (1046). St Mary's (1190–1225) is the only church now kept up for the use of the inhabitants. Pop. 6666.

Wisconsin, the twentieth in area and fourteenth in population of the United States, lies between Lakes Michigan and Superior and the Mississippi River, with its tributary the St Croix; the surrounding states are Michigan, Minnesota, Iowa, and Illinois. Its length is about 300 miles and its breadth 250, with an area of 56,040 sq. m. The surface is a rolling plain with an elevation of 600 feet, rising to 1800 feet at the divide, about 30 miles south of Lake Superior. The general slope is south-westward toward the Mississippi, into which four-fifths of the streams flow. The principal of these are the Chippewa, the Black, and the Wisconsin, which furnish abundant water-power. The Fox, which occupies part of the same valley with the Wisconsin, flows north-eastward into Green Bay. It also passes through Lake Winnebago, the largest lake entirely within the state (28 miles by 10). There are about two thousand small lakes, often with picturesque outlets through narrow rocky gorges called 'dells,' or in the north forming rapids or cascades. These lakes are a striking proof of extensive glacial action, and a range of hills, the Kettle moraine, marks the edge of the enormous bed of ice which once covered all the state except the south-western part, called by geologists the 'driftless area.' The Archæan rocks of the northern part of the state testify that this was the oldest part of the continent. Next come the Huronian rocks, containing valuable beds of iron ore, and intermixed in the north-west with the copper-bearing formation of Lake Superior. To the south are sandstone and limestone formations, furnishing excellent building material, and in the south-west containing lead and zinc ores. Dense forests, consisting chiefly of white pine and other coniferous trees, but having also oaks and other deciduous trees, once covered most of the state, though the southern part is prairie land, with many oak groves or 'openings.' The present forest area is 48·8 per cent. of the whole (but see TIMBER, p. 211). The average annual temperature of the state is 42°, but in the southern part it is 46°.

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The chief industry in the state is agriculture, employing about 400,000 persons. In 1891 the grain-product was valued at $38,849,322. In the product of lumber Wisconsin ranks third among the states, the amount in 1885 being valued at $27,000,000, while the manufactures of wood were valued at $14,000,000, and those of wagons, &c. at $5,000,000. In the lumber regions extensive conflagrations sometimes occur, the most disastrous being in October 1871, when the fire swept over portions of eight counties and destroyed a thousand lives. In iron-mining Wisconsin holds

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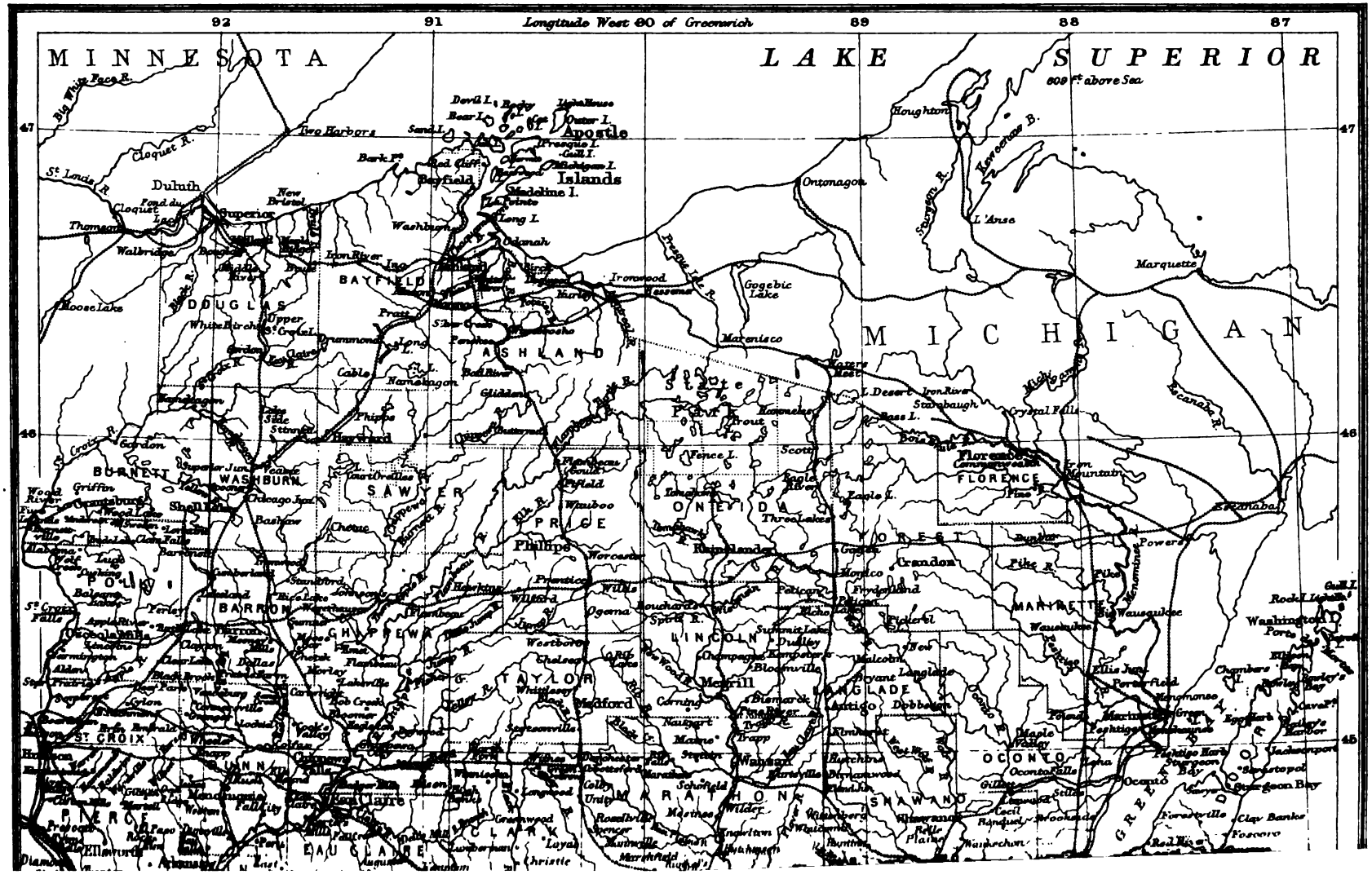
92
91
Longitude West 90 of Greenwich
89
88
87
MINNESOTA
LAKE SUPERIOR
609 ft above Sea
47
46
45
Big White Face R.
Cloquet R.
Two Harbors
St. Louis R.
Duluth
Superior
Thomson
Wolbridge
Moose Lake
Apostle Islands
Bayfield
Madeline I.
Washburn
Odanah
Iron River
Ino
BAYFIELD
DOUGLAS
Upper St Croix L.
Drummond
Long L.
Cable
Namekagon
Red River
ASHLAND
Phillips
Flambeau R.
Ontonagon
Ironwood
Gogebic Lake
Marenisco
Porcupine L.
Sturgeon R.
Keweenaw B.
L'Anse
Houghton
Marquette
M I C H I G A N
Escanaba R.
Florence
FLORENCE
Iron Mountain
Crystal Falls
L. Desert
Iron River
Stambaugh
Bass L.
Pine R.
Trout L.
Fence L.
Scott
Eagle River
Eagle L.
Three Lakes
ONEIDA
FOREST
Rhinelander
Gagen
Monico
Crandon
Pike R.
Powers
Wausaukee
MARINETTE
Pickerel
Ellis Junc.
Peshtigo
Marinette
Menominee
Green Bay
Washington I.
Rock I. Light
Gull I.
Chambers I.
Porte
Bailey's Harbor
Egg Harbor
Fish Creek
Sturgeon Bay
Jacksonport
Sturgeon Bay
Clay Banks
Forestville
Fosoora
Red Mills
Oconto Falls
Oconto
OCONTO
Gillett
Brookside
Cecil
Pound
Wausaukee
Pike Lake
Fifield
Wausau
Wausau
Mosinee
Merrill
Bradley
Tripp
Maine
Stephens
Wausau
Rib Lake
Rib R.
Prentice
Phillips
Worcester
Wilds
Ogema
Spirit R.
Boulder Jct.
Pelican
Pelican L.
Firedland
Sugar Camp
Summit Lake
Dudley
Bloomville
Bryant
Langlade
Antigo
Dobbeln
Elcho
Polar
Deer Park
Birnamwood
Maple Valley
Hatchers
Pittsville
Port Wing
Kimberly
Little Wolf
Wolf R.
Shiocton
Appleton
Kaukauna
Black Creek
Seymour
Hortonville
Embarrass R.
Embarrass
Tigerton
Tigerton R.
Wittenberg
Birnamwood
Elderon
Marion
Waupaca
Scandinavia
Big Falls
Weyauwega
Fremont
Waupaca
Waupaca R.
Chain O'Lakes
Waupaca
Little Wolf R.
Manawa
Royalton
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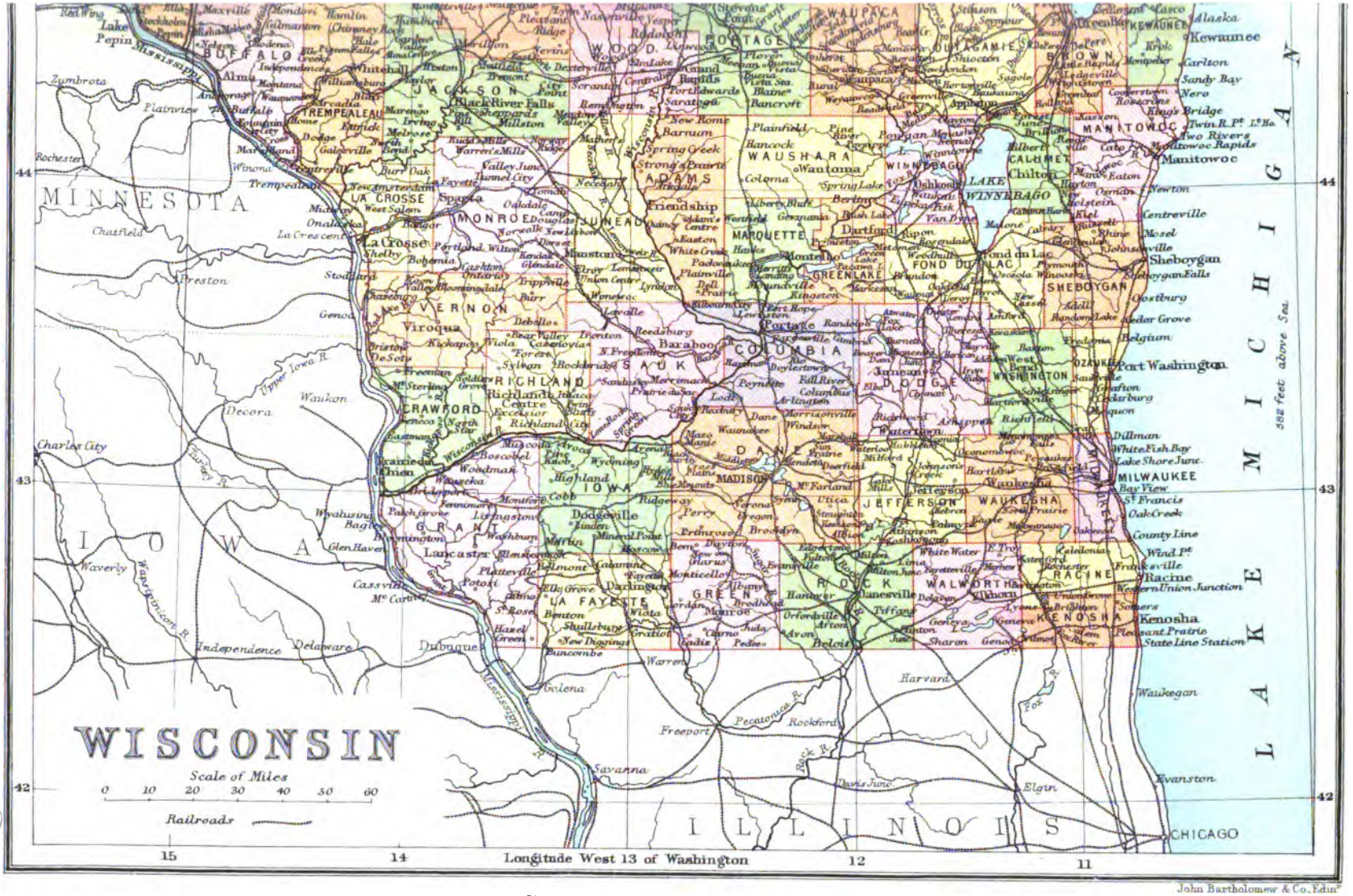

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the sixth rank, its product being over 116,000 tons of pig-iron and 60,000 tons of rolled iron. Manufactures of leather amount to $9,000,000; and beer is produced, chiefly at Milwaukee, to the value of $11,000,000 annually. Wisconsin is divided into sixty-eight counties, and sends nine representatives to Congress. Education is liberally supported. The University of Wisconsin was founded at Madison in 1850; and there are also nine colleges, four normal schools, numerous high schools, and an excellent system of public schools. The state capital is Madison, the leading commercial city Milwaukee (204,468). Other cities having over 10,000 of population are La Crosse, Oshkosh, Racine, Eau Claire, Sheboygan, Fond du Lac, Superior, Appleton, Marinette, Janesville.

Artificial earth-mounds (see MOUND BUILDERS), some in the form of animals, as the turtle and buffalo, are the earliest works of man in Wisconsin. Jean Nicollet was the first white man who visited the state, having entered the Fox River in 1634. In 1665 a Jesuit mission was founded on Green Bay, and French fur-traders soon established trading-posts. Upon the conquest of Canada in 1763 Wisconsin passed under British control, which lasted practically till 1815. Wisconsin Territory, when formed in 1836, extended as far as the Dakotas; but in 1838 the Mississippi was made its western boundary. Ten years later it was admitted as a state. Special efforts were made to attract immigration by the offer of cheap lands, and the result has been an unusually large foreign element in the population—chiefly German and Scandinavian, but including also French and Swiss. Many of these foreigners settled in communities, which have tenaciously preserved their original language and customs. Roman Catholics form the most numerous religious body, followed successively by Lutherans, Methodists, Congregationalists, and Baptists. The first railroad was built in 1850; in 1891 there were 5615 miles. During the civil war Wisconsin furnished to the Federal army 91,327 soldiers. Pop. (1850) 305,391; (1870) 1,054,670; (1880) 1,315,477; (1890) 1,686,880. Besides a few civilised Indians, there still remain in the state 7649 tribal Indians, mostly Chippewas, with reservations containing 845,496 acres.

Wisconsin, a river of Wisconsin, rises on the northern frontier, and flows nearly 600 miles south and west to the Mississippi. It is broken by many rapids and falls, but is navigable to Portage City, where a short canal connects with the Fox River, so that there is steamboat communication between Lake Michigan and the Mississippi.

Wisdom, BOOK OF. See ECCLESIASTICUS, SOLOMON.

Wiseman, NICHOLAS PATRICK, Cardinal and Roman Catholic Archbishop of Westminster, was born 2d August 1802, at Seville, of an Irish family settled in Spain. He was brought to Ireland in his childhood, and received his first education at Waterford, whence he was removed to the Roman Catholic College at Ushaw near Durham. In his sixteenth year he entered the English College at Rome, received holy orders at Rome in 1825, and was made S.T.D. and vice-rector of the college. In 1828 he published his *Horæ Syriacæ*, and became rector. As such in Rome he delivered his *Lectures on the Connection of Science and Revealed Religion* (1836); in London he first became known by a series of lectures on *The Doctrines of the Catholic Church* (1836). In the same year he was mainly instrumental in establishing the *Dublin Review*. In 1840 he was named Coadjutor Vicar-apostolic of the Central District of England, with the title of Bishop of Melipotamus *in partibus*, and appointed president of St Mary's College at Oscott. In 1846 he was transferred as Coadjutor Vicar-apostolic to the London district. From shortly after the Reformation the Roman Catholic Church in England had resorted to the expedient of a system of bishops *In Partibus Infidelium* (q.v.), with the title and authority of Vicars-apostolic (q.v.); but from the date of the passing of the Catholic Emancipation Act a desire had gradually sprung up among Catholics for the restoration of the normal form of church government by the establishment of a regular hierarchy. This measure was finally determined on by the pope in the year 1850, and Dr Wiseman was named archbishop of the see of Westminster, being at the same time created cardinal. This measure called forth a storm of religious excitement, which led to the passing of the futile Ecclesiastical Titles Assumption Act (q.v.). During the excitement Wiseman published an explanatory address of great ability and moderation entitled *An Appeal to the Reason and Good Feeling of the People of England on the Subject of the Catholic Hierarchy*. Notwithstanding these unfavourable circumstances, the undoubted abilities and literary eminence of Cardinal Wiseman eventually compelled the admiration of the British public. He took frequent occasion, moreover, by public lectures and addresses on the neutral subjects of education, literature, and art, to identify himself with the spirit of progress, and with the national sentiments of his fellow-countrymen; and in spite of failing health he published a succession of works which possessed much congenial to the sympathies of all cultivated Englishmen. The *Lectures on Religion and Science* already referred to; *On the Connection between the Arts of Design and those of Production;* on the *Influence of Words on Thought and Civilisation;* on the *Points of Contact between Science and Art; Recollections of the Last Four Popes*, and other similar works, obtained an extensive circulation. He died in London, 15th February 1865. He was a scholar of rare and various attainments, a distinguished orator, a graceful and vigorous writer, and an accomplished critic. In addition to the works mentioned above, he published *The Real Presence in the Eucharist* (1836); *Reply to Dr Turton on the Eucharist* (1839); *Lectures on the Ceremonies of Holy Week* (1839); *Essays on Various Subjects* (3 vols. 1853); *Fabiola, or a Church of the Catacombs* (1854), a singularly life-like picture of early Christian life in classic Rome; *Sermons* (2 vols. 1864); with many polemical tracts and other short publications. In 1866 appeared *The Witch of Rosenburg, a Drama in Three Acts;* and *Daily Meditations* in 1868. See Memoir by G. White (1865), and Lord Houghton's *Monographs* (1873).

Wiseman, RICHARD, surgeon to Charles II. (died 1679). See SURGERY, Vol. IX. p. 818; and the monograph by Sir T. Longmore (1892).

Wishart, GEORGE, the martyr, was born in the opening years of the 16th century. He belonged to the family of Pittarrow in Forfarshire, his eldest brother being clerk of justiciary and king's advocate. Though so well-known a figure in Scottish history, few facts of his life have come down to us. In 1538 he was acting as schoolmaster in Montrose, where he incurred a charge of heresy for teaching the Greek New Testament. The following year we find him in Bristol, and again in connection with heresy, of which he had to make public abjuration in the church of St Nicholas in that city. The next few years he spent on the Continent, chiefly in Germany and Switzerland, a memorial of which sojourn is his translation of *The Confession of Faith of the Churches of Switzerland*. In 1543 he was residing in Corpus Christi College, Cambridge, where he had as one of his students a certain Emery Tylney, who has described his tutor as 'a

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man of tall stature, polde headed, and on the same a round French cap of the best; judged of melancholy complexion by his physiognomie; blacke-haired, long-bearded, comely of personage, well spoken after his countrey of Scotland; courteous, lowly, lovely, glad to teach, desirous to learne, and was well travailed.' In 1544 or 1545 Wishart accompanied a commission sent to Scotland by Henry VIII. in connection with the marriage of his son Edward and Mary Stuart. The story of the next two years, the last of his life, told as it is by Knox in his most graphic style, has made Wishart one of the memorable characters of Scottish history. With an enthusiasm and eloquence which filled Knox with admiration, Wishart preached the Lutheran doctrine of justification by faith as opposed to the Catholic doctrine of good works, wherever he could gather a congregation to listen to him. His chief centre was Dundee, though he also found many supporters in Montrose, in Ayrshire, and East Lothian. At this period Cardinal Beaton was supreme in the councils of the nation. Through the schemes of Henry VIII., heresy in Scotland had inevitably assumed a political character, the friends of the new religion looking to England as their strongest ally, while the supporters of the old church as naturally looked to France. Both as a churchman and as a politician, therefore, Beaton sought Wishart's death, nor did he wait long before compassing his end. At his instance Wishart was arrested at Ormiston on the 16th January 1546, and publicly burned at St Andrews on the 12th March of the same year. Three months later Beaton was himself assassinated, his death being undoubtedly in some part due to his merciless dealings with Wishart. After Knox and Andrew Melville, Wishart is the most outstanding figure among the Scottish reformers of the 16th century. By his own labours as a preacher, the tragic manner of his death, by the fact that Knox was first inspired by his teaching and influence, he is to be regarded as one of the leading agents of the Reformation in Scotland.

See David Laing, *Works of John Knox* (vols. i. and vi.); Lorimer, *Precursors of the Reformation;* Dr C. Rogers, *Life of Wishart* (Edin. 1876); Tytler, *History of Scotland* (vol. iii.); Maxwell, *Old Dundee* (1891). In the last two books the question is fully discussed whether Wishart was a Scotsman of that name who was concerned in a proposal made to Henry VIII. for the assassination of Cardinal Beaton. As the question at present stands, no satisfactory decision can be given.

Wishaw, a thriving town of Lanarkshire, 3½ miles ESE. of Motherwell and 15 of Glasgow. Founded in 1794, it was constituted a police-burgh in 1855, and since 1874 has comprised also the villages of Cambusnethan (Lockhart's birthplace) and Craigneuk. Coal-mining is the staple industry, and there are also ironworks. Pop. (1881) 13,112; (1891) 15,252.

Wislicenus, JOHANNES, chemist, born near Querfurt in Prussian Saxony, 24th June, 1835, taught chemistry at Cambridge (U.S.), New York, Zurich, and Würzburg, and in 1885 went to Leipzig as professor. He has done important work in connection with the Atomic Theory, Alcohols, Acids, &c., and has edited a handbook of chemistry (1874–77).

Wismar, the second seaport of Mecklenburg-Schwerin, on the Baltic, at the head of a bay of the same name, 20 miles by rail N. of Schwerin. It has an excellent harbour, carries on an active over-sea trade, and has varied manufactures. Of the walls only four gates remain; but the numerous quaint old houses are a feature of the place, and several of the brick churches, as well as the Fürstenhof, once a ducal residence, date from the 14th and 15th centuries. It was a Hanse town in the 13th century, passed to Sweden in 1649, was taken by the Danes in 1675, and by the Danes, Prussians, and Hanoverians in 1712, when its strong fortifications were destroyed, and in 1803 was pawned to Mecklenburg-Schwerin, which secured it finally in 1828. Pop. 15,797.

Wissembourg (German *Weissenburg*), till 1871 a French fortified town, close to the frontier of the Bavarian palatinate, now a manufacturing town in the German district of Lower Alsace, is on the Lauter, 42 miles NNE. of Strasbourg by rail; pop. 5968. It grew up round a 7th-century Benedictine abbey, and in 1677–97 was ceded to France. Here was fought, on the 4th August 1870, the first great battle of the Franco-German war, in which the Germans were victorious (see FRANCE, Vol. IV. p. 782). The Lines of Wissembourg, originally made by Villars in 1706, are famous—a line of works extending to Lauterburg 9 miles SE. Like the fortifications of the town, those of the lines have now disappeared.

Wistaria, a genus of plants of the natural order Leguminosæ, sub-order Papilionaceæ, having pinnate leaves and flowers in terminal racemes, the pod leathery. The species were formerly included in the genus Glycine. Some of them are amongst the most magnificent ornamental climbers known in British gardens. *W. frutescens*, a native of Virginia, Illinois, and other parts of North America of similar climate, found chiefly in marshy grounds,

Wistaria chinensis.

attains the height of 30 feet, and has beautiful racemes of fragrant bluish-purple flowers. *W. chinensis* or *consequana*, a native of China, has larger flowers in pendulous racemes, and its branches run to the length even of 90 feet. In Britain these plants are generally trained on walls.

Witchcraft. The philosophy underlying the ancient belief in the reality of witchcraft has been already set forth under the heads of DEMONOLOGY, DIVINATION, MAGIC, &c.; here it remains only to discuss the history of this, the most lamentable of human superstitions, as modified by Christianity, the causes of its extraordinary prevalence in the 14th, 15th, 16th, and 17th centuries, and of its gradual decay before the growing light of rationalism and the modern secularisation of the human intellect. A deeply rooted popular superstition adapts itself successively to every form of religious faith, and we soon find all the sorcery of the ancient heathen world imbedded in Christianity itself, and turned to new account in the popular conception of the function of the devil. The fundamental cause of belief in magical processes is the elemental confusion made by the primitive mind between

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subjective and objective relations, between the *post hoc* and the *propter hoc*, the scanty knowledge of natural causes being filled up with hypothetical causes of a metaphysical and supernatural character. Magic depends on occult faculties and devices within the control of the magician, who thus becomes gradually differentiated from the priest, as the possessor of the illegitimate rather than the legitimate means of communication with the unseen. The most rudimentary religions soon come to develop an ethical side; magic, on the other hand, stands apart from the ordinary adoration of spiritual powers, employing theurgy, thaumaturgy, spells, incantations, occult devices, rather than prayer, inspiration, oracles, miracles, and omens. Worship is essentially *rational*, the natural effect of an assumed theory of the unseen and spiritual, capable of being worked out into a theology; sorcery, on the other hand, is essentially *supernatural* and *supra-rational*, affording no adequate basis for a systematised theory. At the same time some of its observed phenomena may form a foundation out of which a special pseudo-science may be built up, as in the theory of augury, astrology, oneiromancy, and divination; but these harmonise into no broad synthesis of a spiritual philosophy, and cannot form foundations for a religion. Sorcery then is ever mysterious, occult, and dreadful, and under its sway man continues to be the sport of the gloomy intellectual and spiritual shadows his imagination ever generates out of the mists of the unknown, imperfect analogy—the foundation of all false philosophy—perverting by a false twist at the outset even man's intellectual faculties, and completing the process by leaving his mind a prey to the wildest vagaries of imagination. It may also be the case that the complex nature of man ever craves for an irrational and supra-sensible element—a material support—around which to cling, and that this remains a necessity to the most highly developed religious sense as well as the most rudimentary. To make the image of a thing is to reproduce it, and it is impossible to distinguish sharply between the visible representation of an object and its invisible and spiritual realisation. To burn an unpopular politician in effigy, to cherish a lock of hair of one we love, to reverence a Madonna and Child in our churches is not a whit more rational, or less irrational rather, than to torture an enemy by slowly burning his wax image or to raise a storm at sea by whipping a bucket of water with a switch. For to human nature in its ordinary conditions the symbol is necessary to any adequate or lasting realisation of the thing symbolised, and when once imperfect analogies and the confounding of the subjective and the objective are admitted, any perversity of imagination in the assumption of supra-sensible relations between things is intelligible enough. The symbolical is apt to be confused with the magical infliction of injury upon an enemy in such Scripture instances as the arrows shot thrice by King Joash on the ground in order to smite the Syrians (2 Kings, xiii. 15–18), and in the horns made by Zedekiah with which to push Syria (2 Chron. xviii. 10); while possibly a parallel may be drawn between the practice of making land barren with enchanted stones and one part of the ruin appointed for Moab (2 Kings, ii. 19–25).

We find then a belief in the possibility of sorcery everywhere in the ancient world—among the Chaldeans and the unimaginative Romans alike—and in Hebrew history the contest between Moses and the Hakhāmīm, or wise men of Egypt, suggests that wonders could be wrought by the *Elohim Acherim* or 'other gods.' The traditional contest between St Peter and Simon Magus in the earliest Christian times shows the same belief; and we find the Fathers all unanimous in this at least, that the fact of sorcery is supported by the strongest scriptural and ecclesiastical authority. The notion of a supreme embodiment of evil, at the head of the whole hierarchy of hell, from the beginning was embodied in Christian belief, and thus the whole human world came naturally to be regarded as ringed round with a countless host of malignant spirits whose work was none other than to thwart the divine purposes by leading men into the rebellion of sin. The ministry of Satan in the trial of Job, the werewolf-like transformation of Nebuchadnezzar, the necromancy of the Witch of Endor raising up the majestic shade of Samuel to pronounce the doom of Saul, the New Testament stories of demoniacal possession, and of the dispossessed devils entering into the Gadarene swine and rushing down a steep place with them into the sea—all these, superinduced upon the elemental belief in sorcery, went to form the Christian conception of witchcraft. Even a Scripture phrase like the 'prince of the power of the air' found only too literal an interpretation in the notion of the transportation of witches through the air to the unholy Sabbath. And of atmospheric phenomena, by a natural enough specialisation of functions, rain was usually left to God, rain with hail to his rival the devil. To obtain control over supernatural powers and lift the veil of the future has from the beginning been a dream dear to mankind, and everywhere has been believed to fall within the power of specially gifted men and women, often, as in the cases of the *evil eye* and *second-sight*, without any special desire for so peculiar a privilege. Certain natural objects and certain rites and observances had in themselves a mysterious power of producing certain effects, and the art of the sorcerer consisted in the knowledge of these mysterious powers and in the skill to combine and direct them to special purposes. Rhythmical incantations were effective in curing wounds and sickness, many to this day in Presbyterian Scotland preserving traces of Roman Catholic ritual; and magical properties adhered to enchanted stones, wands like the rod of Moses and the *caduceus* of Mercury, engraved gems, amulets, horseshoes, moles' feet, mystic numbers, especially Seven (q.v.), animals as the toad and corbie, plants as the elder, thorn, hazel, and rowan—the first and last especially as antidotes to sorcery. To the rhymes of healing there were corresponding maledictions, 'devilish prayers;' and baneful powders were made from the dismembered bodies of the dead or from herbs with naturally baneful properties. The witches' pot of Olaus Magnus is reproduced in the witches' caldron on the blasted heath in *Macbeth*, and indeed the brewing of poisonous hell-broth and dangerous love-philtres is a characteristic occupation of witches everywhere, and explains the old confusion between poisoning and witchcraft from the Latin *veneficium*.

The higher kind of European magic in the middle ages was mixed up with what physical science there then was; and the most noted men of the time, like Roger Bacon and Cornelius Agrippa, were addicted to the pursuit, or were at least reputed to be so. So far from deriving his power from the kingdom of darkness, the scientific magician by the mere force of his art could compel the occasional services of the arch-fiend himself, and make the inferior demons the involuntary slaves of his will. But this allowable magic occupied but a small place compared with the illegitimate prostitution of such powers to the ends of evil, and thus sorcery came naturally to mean the unholy art of employing the artillery of hell against defenceless man—the Black Art proper. Satan moreover required human agents for his damnable purposes, and thus the whole life of

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man became a mere theatre whereon struggled countless hordes of devils, which to specially gifted eyes might sometimes be seen like a thick dust falling to the ground, or like motes in a sunbeam. Wier gives 72 princes and 7,405,925 inferior fiends, but as the astute Pierre de l'Ancre notes so precise a number could only have been communicated by Satan himself. The old heathen gods themselves came to be looked upon as devils with specialised functions—a theory we find imbedded in the demonology even of the *Paradise Lost*. St Augustine's treatise, *De Divinatione Dæmonum*, did much to formulate the orthodox opinion of Western Christianity on the subject, and in course of time the effects apparently produced by the intervention of the sorcerer were universally ascribed to the operations of the wicked angels who delighted to burlesque the divine methods and cause false dreams, visions, and prophetic inspirations, resembling in everything save their origin and their end those so often vouchsafed to the saints. Special personal compacts with the devil naturally came to be believed in, the individual, having the freedom of determining whether his own soul should be ultimately saved or lost, being able by a kind of *post-obit* bargain to purchase power and sensual gratification in this present world at the price of eternal damnation in the next. The literature of sorcery is full of such stories, from the 6th-century Theophilus (q.v.), saved through the special intervention of the Virgin, down to the awful fate of Dr Faustus which supplied a motive to two of the greatest modern masters of tragic art.

Apart from *obsession*, to which all men were liable, the actual fact of the *possession* of individuals, supported on such unexceptionable Scripture authority, was of course indisputable, and we find the power of casting out devils granted by Christ to his apostles continued in the church as a special grace. Pope Cornelius in the 3d century speaks of the Exorcists as a special order of the clergy, and the fourth Council of Carthage (396) prescribes a form for their ordination the same in substance as that given in the Roman *Pontifical* and used at the present day. There were six general symptoms of possession: barbarous and discordant screams, a fierce and horrid visage, numbness of the limbs, restlessness, unnatural strength, personal suffering—feeling the demons creeping like ants between the flesh and the skin, or like the pricking of needles. Speaking an untaught language was also held an infallible proof. The most effectual means of expulsion were holy water, consecrated wax, the *clangor campanarum*, and fumigation, which in *Tobit* is effectual in driving an obstinate Incubus from Ecbatana to Egypt. The exorcist first endeavours to fix the demon in the tongue, and during the process he applies rue or relics to the demoniac's nose, the while provoking the demon to come out by opprobrious epithets. Some go forth as bees or ants, with a loud noise and hissing, others are imprisoned in a ring or phial, or escape in the body of some animal. It is often necessary to hold down the demoniac under water lest the fiend take refuge in his hair.

But, as regards sorcery, witchcraft, and compacts with the devil generally, many individual theologians and a whole series of provincial councils had pronounced such beliefs to be heathenish, sinful, and heretical, and even in Gratian's Decretal there was a canon requiring the clergy to teach the people that witchcraft was a delusion, and as such incompatible with Christian faith. And indeed it was not till after the establishment of the Inquisition in the beginning of the 13th century that witchcraft came fully to be recognised as falling within the province of the church—regarded simply as a correlative with heresy, both the work of the agencies of hell employed to pervert the faithful from the truth, and therefore to be punished with torture and the stake. The wide-spread social misery of the 11th and 12th centuries, the alarming spread of Catharist and Waldensian heresies, the terror of the Black Death which devastated the whole of western Europe in the 14th century, and its startling concomitants, the Flagellant and Dancing manias, had all contributed naturally to prepare men's minds for a conviction of the reality of Satanic agencies operating with fresh virulence in the world, and terror induced persecution, while in its turn persecution propagated terror. The general theories on the subject were early formulated by the Inquisitors, to whose leading questions alone may be attributed the substantial identity in the confessions made by thousands of poor distracted creatures racked by the agonies of torture, and the awful terrors of the stake and an eternity of hell. The stern injunction in the Mosaic law (Exodus, xxii. 18) was claimed as proof of the fact of witchcraft, and the obscure passage 'because of the angels' (1 Cor. xi. 10), together with that in Gen. vi. 2, was taken to establish the reality of the *Incubus*, a form of demon addicted to unclean commerce with women. Such inversions of nature as monachism and clerical celibacy generated all manner of notions as to the inherent pravity of women, in whom a morbid monkish imagination saw the favourite agents of the devil. And such a phantasy as Gautier's *Morte Amoureuse* may well have visited the imagination of many a virtuous monk as the revenge of nature against the struggle to attain a fictitious virtue. Demoniality or carnal connection with demons was a besetting snare to mediæval nuns, and Sprenger ascribes to nothing else the great 15th-century development of witchcraft. Aquinas is very strong upon the point; and were not the Huns known to be sprung from such connections?

Incubi and Succubi infested nuns and monks in turn, and sometimes had the devilish malice to assume the form of a holy man or woman and allow themselves to be caught in a compromising situation. To gratify lust, to obtain power to forecast the future, to gain wealth, to gratify enmity were the chief ends of all witchcraft, and the last embraced every form of evil which wicked ingenuity could devise. None of the devices of witchcraft was more persistent or distressing than the magic 'ligatures' which prevented the consummation of marriage. A belief in the reality of this was maintained by many provincial councils or synods and hundreds of bishops, and we are told how the father of Guibert de Nogent suffered the impediment for seven years, during which his wife magnanimously refused to avail herself of this pretext for a divorce. Nor against the dread of witchcraft was there any remedy; exorcism and the invocation of saints could avail only in demoniacal possession—for witchcraft the only cure was to get surcease from the devil through the intercession of other witches. The difficulty of the contrast between the illimitable power for evil of the witch and her helpless inability to save herself was explained by the fact that through the goodness of God the power of the witch left her as soon as she was seized by the officers of justice. Moreover, that power could be broken by drawing her blood 'above the breath,' or by employing in precaution the vervain, the mountain-ash, and the like, or the horseshoe over one's doorway. Her own state of wretchedness while enjoying immense power for evil over others was due to the radical faithlessness of the devil. The details of the witches' Sabbath varied very little throughout Europe, being for the most part

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a mere parody of the rites of divine service, eked out with filthy and unmeaning ceremonies. Music and dancing with lascivious orgies were its most characteristic features, and Sinclair (*Satan's Invisible World Discovered*, 1685) assures us that the devil often acted as piper, and taught many of those bawdy songs and their tunes unhappily so popular. Torture induced confessions which when made had to be adhered to, for Sprenger and most of the other inquisitors were strongly against pardon being granted even to a repentant witch. One of the especial tasks of the witch was the killing of unbaptised children, and many acted as midwives for no other purpose. The power of enduring torture was a special grace granted them by the devil, and other characteristic signs were crossing the legs, intertwining the fingers, women throwing their hair loose, walking backwards or contrary to the course of the sun (Scot. *widershins*), an inability to shed tears or repeat the Lord's Prayer, and especially the impression upon some part of the body of a secret mark imprinted by the devil at the Sabbath, when witches renounced their baptism and professed formally their submission. To discover this the prisoner was often shaved from head to foot, and subjected to horrible indecencies in the examination. This part was supposed to be insensible to pain, and one of the chief devices of the infamous 17th-century English witch-finder, Matthew Hopkins, was to prick the body of his victim all over until he found the spot. If his search was fruitless, he placed the witch cross-legged on a table in the middle of a closed room, with a hole in the door for the imps to enter by. In this manner she was kept for a day or even two days without sleep or food. Next she was walked up and down till her feet were blistered. By this time confessions enough were mostly forthcoming; but if all this had failed she was flung into a pond with thumbs and toes tied together cross-wise, when if a witch it was impossible for her to sink. The value of the watery ordeal depended upon the fact that Satan, being very light, supported those that were his own. Their extraordinary levity was again seen when they were weighed in the scales against the Bible. But these English tortures were gentleness itself compared with the infamies habitual to the Inquisition, and not unknown to Scottish Presbyterianism. And even in Scotland, though witches were occasionally burned *quick*, they were usually strangled before the fire reached them. They are supposed to have been fastened to the stake with those witch-bridles examples of which exist.

As we have seen, it was not till towards the close of the 13th century that the Inquisition succeeded in including sorcery within its jurisdiction. The university of Paris gave all the weight of its learning in 1398 to the reality of the fact, and already in 1330 Pope John XXII. had given a powerful impetus to the persecution; but it was not till 1484, when Innocent VIII. issued his infamous bull *Summis desiderantes affectibus*, that the reign of terror really began. The earliest detailed account of witchcraft is found in Nider's *Formicarius* (1337), in which we can trace the development out of ordinary sorcery. The *Flagellum Hæreticorum Fascinariorum* of the Inquisitor Nicholaus Jaquerius (1458) already shows the Holy Office realising the need of a regular procedure, and this was at last given with much fullness in the infamous *Malleus Maleficarum* (1489), the work of the sincere fanatic Sprenger and his coadjutor, Krämer (Institor), who, armed with Pope Innocent's bull, traversed Germany, leaving behind them a track of blood and fire. The infection spread far and wide, and witches were no longer burned in twos and threes, but in scores and hundreds. In the small bishopric of Bamberg within three months 600 perished; in Würzburg, which is scarcely larger, 900; in Geneva, 500 (1515); in the district of Como, Bart. de Spina (*De Strigibus*) says over a hundred were burned every year; at Toulouse 400 perished together, and 50 at Douay in a single year; Nicholaus Remigius, a judge of Lorraine, boasts in 1597 that he had condemned 900 in fifteen years; the Archbishop of Trèves avenged the coldness of the spring of 1586 upon 118 women and 2 men burned together. And his promptitude was well advised, for some of his victims on the way to their place of doom declared that with three more days they would have brought cold so intense as to destroy every green thing, and plunge the whole country into starvation. The Inquisition did its work effectively, for Paramo boasts that by 1404, within a century and a half of its foundation, it had burned at least 30,000 witches who, if left unchecked, could easily have brought the whole world to destruction. The charge of sorcery had been a prominent feature in the infamous trials of the Templars in France; the Maid of Orleans had been burned on this charge at Rouen in 1431 at the instance of the English, but by sentence of a French bishop; and these cases, with that of the Vaudois, or witches of Arras, of whom 34 were arrested and 12 burned (1460), were the most conspicuous examples of such processes before the identification between sorcery and heresy was complete, and the jurisdiction passed finally into the control of the Inquisition. The progress of the witchcraft epidemic had indeed not been rapid, and all three cases had aroused widespread public incredulity, while Joan's character was solemnly rehabilitated in 1456; and the Parlement finally in 1491 upset the Arras processes and sentences as unjust and excessive, ordered reparation to be made even to the dead in the shape of masses for their souls, and decreed that the cruel and unusual tortures employed should be prohibited for the future in all secular and ecclesiastical tribunals. Perhaps in consequence of all this the Inquisition made its way much slower in France than in Germany and Italy. But the most severe rebuff it experienced was from the republic of Venice, which had jealously preserved the secular jurisdiction over sorcery. Brescia had become specially infested by witches, and in 1510 as many as 70 men and 70 women were burned there; in 1514, 300 at Como; while it was currently reported that the Sabbath on the plain of Tonale near Brescia was attended by 25,000; and finally in 1518 the senate was informed that the inquisitor had burned 70 witches of the Valcamonica, that he had as many more in his prisons, and that those suspected or accused amounted to about 5000, or one-fourth of the population of the valleys. The Signoria at once interposed its veto, and even the fiery bull of Leo X., *Honestis* (1521), could not force its outraged sense into submission.

The Reformation of the 16th century made no change in the popular view of witchcraft, which, indeed, rather rose to a height during the 17th century. Theologians of all confessions believed in the possibility and reality of compacts with the devil as strongly as they believed in the dogma of the personality of the devil itself. Erasmus and Luther were equally strong believers in witchcraft, and the latter realised the active interference of the devil as few men have done in any age. Catholic and Protestant theologians alike defended the prosecutions; on the one side, Jean Bodin, Peter Binsfeld, and the Jesuit Martin Delrio; on the other, the Heidelberg physician Thomas Erastus, King James I. of England, and the

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famous criminal lawyer Carpzov of Leipzig. But in spite of this array of learning, and the vast preponderance alike of clerical and lay opinion, there had not been wanting a succession of honest doubt, whether from natural scepticism or from humanity. Johann Wier (q.v.), a physician, by his famous work, *De Præstigiis Dæmonum* (1564), and its complements, *De Lamiis* and *Pseudo-monarchia Dæmonum* (appended as a sixth chapter to the 1577 edition), has left a name imperishable among the benefactors of humanity. His scepticism was not too strong, but he went as far as he durst, and evidently meant to imply more than he dared say. The reply of the famous political philosopher, Jean Bodin, *De Magorum Dæmonomania* (1579), is mainly an indignant and completely credulous appeal to authority—to universal law, the Scriptures, and the Fathers. The great work of the enlightened Englishman, Reginald Scot, *The Discoverie of Witchcraft*, followed in 1584, and stands alone, more than a century before its time, as a full and outspoken appeal to reason and to humanity against a puerile and cruel superstition. Montaigne in his essay 'Of Cripples' (1588), with regard to this question, strikes the fundamental note of modern rationalism, and adds with exquisite irony, 'after all, it is setting a high value on our conjectures to roast a man alive on account of them.'

Yet it was only very gradually that the superstition gave way. Nicholaus Remigius published his *Dæmonolatria* in 1595, the Jesuit Martin Delrio his erudite and ponderous *Disquisitiones Magicæ* in 1599. But two Jesuits may also be counted among the earliest enemies of the superstition, Adam Tanner (1572–1632) and Friedrich Spee, whose *Cautio Criminalis, seu de Processibus contra Sagas* (1631), was an appeal for more circumspection in the trials, the author having been present at many of these in the dioceses of Würzburg and Bamberg, and having come to the conclusion that many of the victims were entirely innocent. He advances no less than fifty-two doubts, and his conclusion is that there is so much difficulty in such cases that processes should be suspended. He dared not put his name to his work, and could print it only in a Protestant town, Rinteln. The Dutch Protestant Balthasar Bekker, in his curious work *De Betoverde Wereld* (1691–93), expresses openly a strong disbelief in sorcery, magic, possession by the devil, and even the existence of the devil himself. He was deposed and excommunicated for his temerity. The great Halle jurist, Christian Thomasius, published in 1701 a masterly tract, *Theses de Crimine Magiæ*, which did much to educate the public opinion of Germany. But the devil did not give way before the philosophers without a struggle. There was a great outburst of lycanthropy in the latter half of the 16th century in southern France, the most interesting trial being that of Gilles Garnier at Dôle in 1573. The provincial Parlements of Paris, Rouen, Rheims, and Bordeaux enacted stringent decrees against all forms of witchcraft, and the cases of some of their victims give reason to suspect the real guilt of toxological practices, thus reviving the full signification of the ancient *veneficus*. The Parlement of Bordeaux appointed a commission to inquire into the causes of the prevalence of witchcraft in the Basque provinces, and these remain to the curious in the work of Pierre de l'Ancre, one of the most interesting of its class, *Tableau de l'Inconstance des Mauvais Anges et Démons* (1612). He found the whole population of the Labourd infected with witchcraft—the men, the women, and even the priests and children, as many as 2000 of the last alone flocking nightly to the Sabbath. He sees a singular affinity between tobacco and sorcery, and finds a special significance in the Basque fondness for the apple, the fruit of transgression; but the real reason why women are naturally so much more prone to sorcery than men he thinks most probably a secret wrapped up in the inscrutable wisdom of God. Another phase of witchcraft rife in France during the 17th century was demoniacal possession, and this reached its height in the strange convulsions of the Ursuline nuns of Sainte-Baume near Aix, and the abominable immoralities of their corrupter Louis Gauffridi, burned alive deservedly in 1611; in the famous case of Urban Grandier (burned 1634) and the nuns of Loudun in Poitou; and in the ecstatic trances of Madeleine Bavent and her guilty relations with her abandoned confessor at the convent of Louviers (1635–47). These unedifying histories of lust and cruelty may be read in the glowing pages of Michelet, *La Sorcière* (2d ed. 1862). In the same century the fires of persecution raged hotly in Bamberg and Würzburg, as many as 900 trials having taken place in the reign of the prince-bishop John George II., in the two courts of Bamberg and Zeil between 1625 and 1630, and 600 are supposed to have been burned, so little care being taken that the accused are not enumerated by name, but merely cited as No. 1, 2, 3, and so on. Under Bishop Philipp Adolf, who came to the see of Würzburg in 1623, a great confederacy of sorcerers was quickly discovered, and during two or three years hundreds of persons of all ages and conditions, children of ten and twelve years old, vicars, canons, students, together with 'Göbel's child, the most beautiful girl in Würzburg,' were hurried to the stake. The ghastly catalogue of these victims in twenty-nine burnings is printed in Hauber's *Bibliotheca Magica*, and reprinted in Thomas Wright's excellent *Narratives of Sorcery and Magic* (2 vols. 1851). A great epidemic of witchcraft broke out in the village of Mohra in Sweden in 1699, and a commission of clergy and laymen appointed by the king examined as many as 300 children, and found a singular unanimity in the confession of particulars. Seventy persons were condemned to death, 15 being children, while 36 more between nine and sixteen were forced 'to run the gantlet,' and 20 more were whipped every Sunday for a year. See the account by Anthony Horneck, D.D., appended to Glanvill's *Collection of Relations*.

In 1672 we find Colbert directing the magistrates in France to receive no accusations of sorcery and commuting sentences of death into banishment, an indulgence against which the Parlement of Rouen protested as dishonouring to God and Christian tradition. The most remarkable trial for sorcery at this period was that of the Marshal of Luxembourg in 1681, and we find in the last two decades of the century only seven sorcerers burned in France. Yet the Parlement of Bordeaux burned a man as a *noueur d'aiguillettes* in 1718; and in spite of all the boasted illumination of the 18th century an old nun was burned as a witch at Würzburg in 1749. In the year 1754 a girl of thirteen, and in 1756 another of fourteen, were put to death at Landshut on suspicion of witchcraft. A servant-girl at Glarus in German Switzerland in 1782 was the latest judicial victim in Europe—the last of 300,000 women who are computed to have perished since the promulgation of the bull of Innocent VIII. Within the range of Catholicism, so late as 20th August 1877, five witches were burned alive by the Alcalde Ignacio Castello of San Jacobo in Mexico, 'with consent of the whole population.'

England was long preserved from the infection of regular persecutions for witchcraft, the first formal enactment declaring it a felony dating only from 1541. Besides, as we have seen in the Templar trials, torture was naturally repellent to the national spirit, and without systematic torture

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and leading questions such prosecutions could not thrive. At the same time there had been ever since the Conquest occasional trials for sorcery, and victims had been burned by the king's writ *De Hæretico comburendo*, after condemnation in the ecclesiastical courts. The Act of 1541 was supplemented by another under Elizabeth in 1562, and in the first year of James I. was passed the law which continued in force for over a hundred years. Its most important section ran as follows: 'If any person or persons shall use, practise, or exercise any invocation or conjuration of any evil and wicked spirit, or shall consult, covenant with, entertain, employ, feed, or reward any evil and wicked spirit to or for any intent or purpose, or take up any dead man, woman, or child out of his, her, or their grave or any other place where the dead body resteth, or the skin, bone, or any part of any dead person, to be employed or used in any manner of witchcraft, sorcery, charm, or enchantment, or shall use, practise, or exercise any witchcraft, enchantment, charm, or sorcery, whereby any person shall be killed, destroyed, wasted, consumed, pined, or lamed in his or her body or any part thereof,' every such offender is a felon without benefit of clergy. We find in earlier days sorcery regarded with a kind of vague dread, heard of occasionally in such cases (in large part political) as those of Dame Alice Kyteler of Kilkenney, who saved herself only by flight in 1324, leaving her obscurer accomplices to perish; the Duchess of Gloucester, who did public penance and was imprisoned at Chester, while her secretary was hanged and her accomplice, the celebrated Witch of Eye, Margery Jourdemayne, burned (1441); and Jane Shore; but the wisdom of the Modern Solomon brought a knowledge of it down to everyday village life, and what had heretofore in England caused but occasional local mischief now became a virulent epidemic frenzy. In Cranmer's 'Articles of Visitation' (1549) an injunction is addressed to the clergy, that 'you shall inquire whether you know of any that use charms, sorcery, enchantments, witchcraft, soothsaying, or any like craft invented by the devil.' Strype tells us Bishop Jewell, preaching before the queen in 1558, said: 'It may please your Grace to understand that witches and sorcerers, within these last few years, are marvellously increased within your Grace's realm. Your Grace's subjects pine away even to the death, their colour fadeth, their flesh rotteth, their speech is benumbed, their senses are bereft. I pray God they never practise further than upon the subject.' Reginald Scot's protest fell unheeded, or rather roused the king to write his *Dæmonologie* (1597), which was ostensibly aimed against the 'damnable opinions of Wierus and Scot, the latter of whom is not ashamed in public print to deny there can be such a thing as witchcraft.' In Lancashire especially there was found to be a deplorable increase of witches; in 1612 fifteen were indicted at Lancaster and twelve condemned, and in 1634 seventeen Pendle Forest witches were condemned on the evidence of one boy, who was fortunately discovered to be an impostor. Under the Commonwealth there was a great increase of persecution, and especially in the Puritan eastern counties. The infamous 'Witch-finder General' Matthew Hopkins pricked, waked, and swam hundreds of unhappy women in Essex, Suffolk, Norfolk, and Huntingdonshire, carrying with him an assistant and a female searcher, and charging twenty shillings expenses in every town he visited. Hopkins caused to be hanged sixty in one year (1644) in Essex, and [Bishop] Hutchinson in his reliable *Essay on Witchcraft* (1718) enumerates sixteen executions at Yarmouth in 1644, fifteen in Essex in 1645, nearly forty at Bury St Edmunds in 1645–46—among these last 'an old reading parson,' John Lowes, who had been for nearly fifty years vicar of Brandeston in Suffolk, and who under torture confessed to having employed two imps to sink a ship. Baxter in his *Certainty of the Worlds of Spirits* (1691) tells with approval this pitiful story, and elsewhere we are told how the old man read the burial-service for himself just before his execution. John Gaule, vicar of Great Staughton, published his *Select Cases of Conscience touching Witches and Witchcraft* (1646), attacking the methods of Hopkins, and it is a satisfaction to find that there is every probability Hopkins was himself swum and hanged in 1647. One of the most striking cases occurred in 1664, when the enlightened Sir Matthew Hale tried and condemned two women, Amy Duny and Rose Cullender, at Bury St Edmunds, for bewitching children, the opinion of Sir Thomas Browne, who was present, telling with great weight against the prisoners. Chief-justices North and Holt were the first in high places who had the good sense and the courage to set their faces against the continuance of this delusion, and to expose the general absurdity of such charges. The last trial in England was that of Jane Wenham, convicted at Hereford in 1712, but not executed.

But popular beliefs die hard, and we find a poor paralysed Frenchman dying in consequence of being swum by a mob at Castle Hedingham in Essex in 1865, and again in 1879 at East Dereham in Norfolk a man fined for assaulting the daughter of an old woman who had charmed him by a 'walking toad.' And even in the *Daily News* of April 12, 1890, we read that at the inquest on the body of a child at Fressingfield in Suffolk the parents confidently ascribed its death to the witchcraft of its step-grandmother, who had died a few hours before it. The child was taken out in a perambulator from which the father saw smoke come forth, while the mother said the child when it was brought home was hot and dry and smelt of brimstone. But indeed the spiritualism and theosophy of the 19th century harmonise well with the exploded doctrine of witchcraft, and would have given much comfort to Bodin, Remigius, or Delrio. We have seen Sir Thomas Browne and Baxter's conviction of the reality of witchcraft, and we find Selden, with characteristic caution, recommending that witches should be hanged for their malignant intentions at any rate. Three books which deserve to be named in the roll of honour as outspoken appeals to humanity and sense are *A Candle in the Dark*, by Thomas Ady (1655), *The Question of Witchcraft Debated*, published anonymously by John Wagstaffe (1669), and *The Displaying of Supposed Witchcraft* (1677), by John Webster, a work of singular vigour and ability. Hobbes was sceptical on the matter, but the philosophical Glanvill in his famous *Sadducismus Triumphatus* (1681) made a bold attempt to buttress the already decaying belief, maintaining that Atheism grew out of Sadducism, and that witches once disproved, all spiritual existence disappeared with them. More and Cudworth approved the book, and even so late as 1768 John Wesley repeated the same argument: 'It is true likewise that the English in general, and indeed most of the men of learning in Europe, have given up all accounts of witches and apparitions as mere old wives' fables. I am sorry for it, and I willingly take this opportunity of entering my solemn protest against this violent compliment which so many that believe the Bible pay to those who do not believe it. I owe them no such service. I take knowledge that these are at the bottom of the outcry which has been raised, and with such

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insolent spread through the land in direct opposition not only to the Bible, but to the suffrage of the wisest and best of men in all ages and nations. They well know (whether Christians know it or not) that the giving up witchcraft is in effect giving up the Bible.'

Nowhere were the witchcraft trials more cruel than in Scotland, where the clergy controlled the whole social life, and an iron theology dominated the imaginations of men; the more vividly the torments of hell are realised the more callous do men ever become to human sufferings in this world. We find the Scottish clergy throughout the leading managers of the prosecutions, before whom the confessions were taken and the tortures inflicted. The ministers and kirk sessions were required to make strict inquisition, and private accusations were invited even from the pulpit. There is but little account of sorcery in the earliest Scottish records, scarce anything in Fordun, but enough in Wyntoun, and ample store also in the *Breviary of Aberdeen* (1510). The statute of 1563 was the first regular enactment, and the earliest conviction is supposed to have been that in 1479 for consuming a waxen image of the king. Yet comparatively early we find it occasionally ascribed to persons of high estate. Sir Michael Scott of Balwearie, and William, Lord Soulis of Hermitage Castle, who was boiled to death, were notable sorcerers; Janet Douglas, Lady Glammis, was executed under James V. (1537) for devising the death of the king by poison or witchcraft; John Knox mentions the Countess of Huntly as a notable patroness of witches, and himself was supposed to have gained the affections of Lord Ochiltree's youthful daughter by sorcery; Catherine Ross, Lady Fowllis, only escaped with difficulty on a charge of sorcery in 1590; and the Earl of Gowrie of the mysterious conspiracy was a master of magic, the word *Tetragrammaton*, found written in parchment on his body, preventing the blood flowing even when he was dead. Some ten years earlier a vast hellish conspiracy was formed near Edinburgh to drown King James VI. on his voyage from Denmark. It centred round Doctor Fian, *alias* John Cunningham, master of the school at Saltpans in Lothian, and Agnes Sampson, the 'Wise Woman of Keith' (Haddingtonshire), whom Archbishop Spottiswoode describes as 'a woman not of the base and ignorant sort of witches, but matronlike, grave, and settled in her answers, which were all to some purpose.' Fian's nails were torn from his fingers, and his legs were crushed by the boot till the marrow was squeezed out of the bones, and finally, in January 1591, he ended his sufferings in the fire. The confessions of the woman told how as many as two hundred witches had flocked to the kirk of North Berwick, where the devil preached damnable blasphemies and denunciations of the king, and made all the witches kiss his bare buttocks over the pulpit. Dr W. Ramesey in his *Elminthologia* (1668) tells us he saw nine witches burning together on Leith Links in 1644, and about 1650 we hear of John Kincaid of Tranent, especially skilful as a pricker, using pins about three inches in length. We read in Pitcairn how Alesoun Balfour was burned at Kirkwall in 1596, after being tormented with the *caschielawis* for forty-eight hours, her aged husband before her eyes bound in the *lang irnis* of fifty stone weight, her son tortured with the *boot* to the extent of fifty-seven strokes, her daughter, but seven years old, put in the *pillie-winkis* (thumbscrews). The Restoration set the witch-fires ablaze with greater fury than ever, ignorant justices abetted by frenzied ministers sentencing all delated to them. As many as fifty commissions from the Privy-council to individuals of certain districts to hold trials, each with the names of from one to ten delinquents, were issued within eight months from January 1662, and these distinct from the ordinary Court of Justiciary, Sheriffs, and Bailies of Regalities. One of the most striking cases was that of Isobel Gowdie of Auldearn, burned in 1662 after a series of confessions of unusual imaginativeness, printed in full by the painstaking Pitcairn. This small district contained at that time so many witches that Satan, for convenience, was obliged to divide them into companies of thirteen, called *covines*. Major Weir was strangled and burned at Edinburgh in 1670 for sorcery and incest; his sister Jean, who confessed to intercourse with evil spirits, and employed a *familiar* to spin her lint, was hanged the day after. In 1662 there was a great outburst of witchcraft at Inverkip, Renfrewshire, where Marie Lamont, a girl of eighteen, made a series of remarkable confessions. In Renfrewshire also seven suffered in 1697 at Paisley for bewitching Christian Shaw, of Bargarran, a girl of eleven, who afterwards was the means of beginning the thread-manufacture in Paisley. Other more notable cases occurred also at Kinross (1718), Spott in East Lothian (1705), Pittenweem (1704); as well as the death through the use of a waxen figure of Sir George Maxwell of Pollock in 1677, for which five suffered at Paisley, and the obstinate bewitching of Lord Torphichen's son in 1720. The last execution in Scotland took place at Dornoch in 1722, where a poor old woman perished for having ridden her own daughter, transformed into a pony, and shod by the devil, which made the girl ever after lame, both in hands and feet, as well as her son after her. The weather was cold, and the old woman sat quietly warming herself by the fire prepared to burn her while the preparations were being made. Sir George Mackenzie (q.v.), who is not usually credited in Scotland with humanity, among other sensible and humane remarks on witchcraft, adds: 'Most of these poor creatures are tortured by their keepers, who, being persuaded they do God good service, think it their duty to vex and torment poor prisoners; and I know, *ex certissimâ scientiâ*, that most of all that ever were taken were tormented after this manner; and this usage was the ground of all their confession.' William Forbes, professor of law in Glasgow, declares his firm belief in witchcraft in his *Institutes of the Law of Scotland* (1730), defining it as 'that black art whereby strange and wonderful things are wrought by a power derived from the devil. . . . Nothing seems plainer to me than that there may be and have been witches, and that perhaps such are now actually existing; which I intend, God willing, to clear in a larger work concerning the criminal law.' The statutes against witchcraft were finally repealed in 1736, to the great displeasure of the leading seceders from the Church of Scotland, for we find enumerated, in the confession of national and personal sins printed in an act of the Associated Presbytery at Edinburgh in 1743, the act of Queen Anne's parliament tolerating Episcopacy in Scotland, the act for adjourning the Court of Session during the Christmas holidays, 'as also the penal statutes against witches having been repealed by parliament, contrary to the express law of God; for which a holy God may be provoked in a way of righteous judgment to leave those who are already ensnared to be hardened more and more; and to permit Satan to tempt and seduce others to the same dangerous and wicked snare.'

Those who crossed the Atlantic for conscience' sake carried all their superstitions with them, and we find an execution for witchcraft in New England as early as 1648, while in the abstract of the laws of that colony, printed in 1655, there stands these articles: 'Witchcraft, which is fellowship by cove-

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death. . . . Consulters with witches not to be tolerated, but either to be cut off by death or banishment, or other suitable punishment.' But the interest of American witchcraft centres in the famous Salem cases (1691–92), the guilt of which may in great measure be laid on the shoulders of Cotton Mather (q.v.), author of *Memorable Providences relating to Witchcraft and Possessions* (1685) and *Wonders of the Invisible World* (1692). Nineteen persons were executed, among the six men one clergyman and Giles Corey, a man over eighty, who, refusing to plead, was pressed to death. All died protesting their innocence, and even those who had been terrified into confession withdrew it, although their honesty cost them their lives. Nor were the victims here at least abandoned by their friends: in all the trials of this kind there is nothing so pathetic, says Mr Lowell, as the picture of Jonathan Cary holding up the weary arms of his wife during her trial, and wiping away the sweat from her brow and the tears from her face. A reaction speedily set in, and, though in January 1693 three more were condemned, no more executions took place, and a few months after the governor discharged all the suspects from gaol, as many as 150 in number. One Samuel Parris, a clergyman who had been one of the main instigators of the prosecutions, confessed his error, but was dismissed by his flock in 1696, while even Cotton Mather acknowledged that there had been 'a going too far in that affair.' This lamentable story is told fully by Charles W. Upham in his *History of the Salem Delusion* (1831; new ed. 2 vols. 1867). See also Mr Lowell in vol. ii. of *Literary Essays* (1890).

Many of the more important books on witchcraft have been mentioned incidentally in the foregoing pages; the names of all the older books will be found in Grässe's *Bibliotheca Magica* (Leip. 1843). A comprehensive collection is that published at Frankfurt in 2 vols. 1582, containing the pertinent books of Sprenger, Nider, Basin, Molitor, the *Flagellum Dæmonum* compiled by Mengus, Gerson, Murner, Malleolus, and Bart. de Spina. Another is the *Theatrum de Veneficiis* (Frankfurt, 1586), containing seventeen tracts by Danæus, Lercheimer, Bullinger, Ewich, Trithemius, &c. Among general books the best accounts of the superstition will be found in Lecky's *History of Rationalism in Europe* (vol. i.), Tylor's *Primitive Culture*, and H. C. Lea's invaluable *History of the Inquisition of the Middle Ages* (vol. iii. 1887). Serviceable books are Thomas Wright's *Narratives of Sorcery and Magic* (2 vols. 1852); Ennemoser's *Geschichte der Magie* (Eng. trans. 1854); Maury, *La Magie et l'Astrologie* (1860); Garinet, *Histoire de la Magie en France* (1818); Heppe's edition of Soldan's *Geschichte der Hexenprocesse* (2 vols. 1880); Scott's *Letters on Demonology and Witchcraft* (1830); Grimm's *Deutsche Mythologie;* Howard Williams, *The Superstitions of Witchcraft* (1865); Roskoff's *Geschichte des Teufels* (1869); Conway's *Demonology and Devil Lore* (2 vols. 1878); Diefenbach, *Die Hexenwahn* (Mainz, 1886); W. H. Davenport Adams, *Witch, Warlock, and Magician* (1889); *Le Sabbat des Sorciers* (1882) and other vols. in the 'Bibliothèque Diabolique;' J. Baissac, *Les Grands Jours de la Sorcellerie* (1890); and C. G. Leland, *Gypsy Sorcery* (1891). An indispensable book for Scotch witchcraft is Pitcairn's *Criminal Trials in Scotland from 1488 to 1624* (4 vols. 1830–33), which may be supplemented by Wodrow's *Analecta*, and especially J. G. Dalyell's *Darker Superstitions of Scotland* (1834), J. H. Burton's *Criminal Trials in Scotland* (2 vols. 1852), and C. K. Sharpe's edition of Law's *Memorialls* (1819), with introduction, itself reprinted as *The History of Witchcraft in Scotland* (1884). See also such folklore books as are really reliable, as those of Pitré, Krauss, Ralston, Mannhardt, &c.; and the articles ANIMISM, APPARITIONS, ASTROLOGY, DEMONOLOGY, DEVIL, DIVINATION, EVIL EYE, EXORCISM, FAIRIES, FAMILIAR, FAUST, INCANTATIONS, MAGIC, SPIRITUALISM, VAMPIRE, WEREWOLF.

Witch-hazel (*Hamamelis virginica*), a North American shrub of the natural order Hamameli-

number of species, much diffused over the world, but none of them European; shrubs or small trees, with alternate, stipulate, feather-veined leaves, and small axillary unisexual flowers. The witch-hazel is a shrub or small tree 10 or 12 feet high. The leaves are 4 inches long and 2 or 3 broad; the flowers clustered, yellow and showy, with long linear petals appearing in the fall of the year, the fruit ripening in spring. The seeds contain a quantity of oil, and are wholesome and edible, while the leaves and bark are astringent, and the tincture is much used for piles, varicose veins, &c. The name is due to the supposed virtues of a forked twig as a divining-rod.

Witenagemót ('the meeting of counsellors,' *witena* being genitive plu. of the A.S. *wita*, 'a wise man,' 'a counsellor'), the great national council of England in Anglo-Saxon times, by which the king was supposed to be guided in all his main acts of government. Each kingdom had its own witenagemót before the union of the several kingdoms in 827, after which there was one for the whole country. It was composed of the bishops, the ealdormen of shires, and a number of the king's friends and dependents, the king's thanes (see THANE). It met frequently, if not at regular intervals, and claimed very extensive powers—which, however, varied inversely with the power of the prince. The witan deliberated in all new laws, made treaties, elected the king, and once deposed one (Ethelred II.), appointed bishops, assented to grants of land, with the king levied taxes, and formed a supreme court of justice. But, as it was a council of royal officers and territorial magnates, it is misleading to identify its functions with its successor, the representative House of Commons. See ENGLAND and PARLIAMENT, and works there cited, especially Stubbs and Freeman.

Wither, GEORGE, poet, was born at Bentworth, Hampshire, June 11, 1588. He was sent to Magdalen College, Oxford, but after two years was called away through family reverses of fortune. At eighteen, however, he found his way to London, and entered at Lincoln's Inn, where he made fast friendship with William Browne, then of the Inner Temple. For his *Abuses Stript and Whipt* (1613), a very abstract satire indeed, he found himself in the Marshalsea, and here, in spite of harsh imprisonment, he wrote his *Shepherds Hunting*, a sweet pastoral, the fourth eclogue of which contains his famous verses on the consoling power of poetry to the poet. It is supposed that his satire addressed to the king (1614), together with the Earl of Pembroke's intercession, procured his release. In 1618 appeared *The Motto*, a curious piece of self-confession extending to two thousand lines, yet, says Charles Lamb, 'we read it to the end without any feeling of distaste, almost without a consciousness that we have been listening all the while to a man praising himself. There are none of the cold particles in it, the hardness and self-ends which render vanity and egotism hateful.' His finest poem, *Fair Virtue, or the Mistress of Philarete* (1622), with the curious inequality of all his work, shows exquisite fancy and here and there pure inspiration. His *Hymns and Songs of the Church* (1623) were authorised by a patent from the king, to the strong displeasure of the Stationers' Company. Accordingly they brought him no profit, although thus ushered into the world and set to music by Orlando Gibbons. His *Psalms of David translated* followed in 1631, his *Emblems* in 1634, his *Hallelujah* in 1641.

By this time Wither had become a fiery Puritan, and in 1642 he sold his estate to raise a troop of horse for the parliament. He was taken prisoner, and is said to have owed his life to the intercession of Sir John Denham, who pleaded with much more

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wit than truth that, 'so long as Wither lived, he [Denham] would not be accounted the worst poet in England.' Later Cromwell made him major-general in Surrey, and Master of the Statute Office. At the Restoration he was stripped of his places and property, and, on suspicion of having written the *Vox Vulgi*, a satire on the parliament of 1661, flung first into Newgate, then into the Tower. He was released in 1663, died May 2, 1667, and was buried in the church of the Savoy Hospital in the Strand.

In character Wither was sincere, resolute, no flatterer even of Cromwell, temperate, devout in all things—his pipe was a sweet solace in Newgate, and he saw God's mercy in wrapping up 'a blessing in a weed.' His books number almost a hundred, but almost all his really excellent verse belongs to the first ten years, collected in his *Juvenilia* (1622; enlarged 1626 and 1633; Spenser Soc., 1870–72). After his death his poetry fell into almost complete oblivion, but the praises of Southey, Sir Egerton Brydges, Hallam, and especially Charles Lamb have restored him to his true niche in the temple of fame, from which he cannot now be degraded. Pope in his *Dunciad* had grouped 'wretched Withers' among the dull of ancient days; Percy in his *Reliques* inserted one of his poems, but did not venture to give his name, and in his fourth edition (1794) describes him as 'not altogether devoid of genius.' Charles Lamb's essay on the poetical works of Wither was first printed in the collection of his own writings published in 1818. It grew out of a series of marginal notes made by him in an interleaved copy of Wither's *Philarete* and other poems, edited and printed by his old school-fellow John Matthew Gutch at his private press at Bristol. This volume was first lent to Lamb by Mr Gutch, next to Dr G. F. Nott, the editor of Surrey and Wyatt, and found its way once more into the hands of Lamb, who again criticised Nott's annotations with no less freedom than critical insight. The volume finally came into the possession of Mr Swinburne, who contributed a full account of it to the *Nineteenth Century* for January 1885.

As a religious poet Wither, in the words of Charles Lamb, reached a starry height far above Quarles, and his sweet fancy and exquisite tenderness irresistibly provoke his readers' love. His earlier poems gave him in later years pangs of unnecessary repentance. A hearty homeliness of manner, a straightforward spontaneity and honesty of speech, a resolute feeling of independence are the characteristic marks of all his work, and, as has been seen, he rises not seldom into the serene atmosphere of real poetry. But his flight is never steady or long sustained, and bathos is doubly damnable in heptasyllabic couplets. The bright little piece, 'Shall I, wasting in despair' (from *Fidelia*, 1615), is known to all English readers, but it is by no means his best poem.

The *Hymns and Songs of the Church* were edited by Edward Farr in 1856 (Spenser Soc., 1880–81), the *Hallelujah* in 1857 (Spenser Soc., 1878–79), and *Vox Vulgi* by the Rev. W. Dunn Macray (1880). *Philarete* was reprinted in vol. iv. of Professor Arber's 'English Garner,' *Fidelia* in vol. vi. Besides those already named, the Spenser Society has reprinted the 'Miscellaneous Works' (six collections, 1871–78), *Britain's Remembrancer* (1879–80), the *Psalms of David* (1880–82), the *Parallelogrammaton* (1881–82), and *Respublica Anglicana, or the Historie of the Parliament* (1882–83).

Witherspoon, JOHN, theologian, was born in the parish of Yester in Scotland, 5th February 1722, studied at Edinburgh, was minister at Beith, at Paisley, and in 1768 was called to be president of the College of New Jersey, and pastor at Princeton. He was a representative of New Jersey to the Continental Congress, became quite blind in 1790, and died at Princeton, 15th November 1794. His works (3 vols. Phila. 1803; and 9 vols. Edin. 1815) include *Ecclesiastic Characteristics* (1753), against the Moderates; a work on the stage (1757); and two treatises which are still read, on *Justification* (1756) and on *Regeneration* (1764).

Witness. See EVIDENCE, OATH.

Witney, a town of Oxfordshire, on the Windrush, 11 miles W. by N. of Oxford (14 by a branch-line, 1861). It has a three-arch bridge (1822), a fine cruciform 13th-century church (restored by Street in 1867 at a cost of over £4000), a staple or blanket hall (1721), a market-cross (1683), a town-hall (1863), a corn exchange (1862), and a county court-house (1859). Its blankets enjoy a great reputation; and glove-making is also carried on. Pop. (1851) 3099; (1891) 3110. See J. A. Giles's *History of Witney* (1852).

Witsius, HERMANN, Dutch theologian, was born at Enkhuysen, February 12, 1636, studied at Gröningen, Leyden, and Utrecht, and served as pastor till 1675, when he was called to a chair at Franeker, in 1680 at Utrecht. In 1698 he was called to Leyden, and here he died, October 22, 1708. His great work is *De œconomia Fœderum Dei cum hominibus* (1685; Eng. trans. 3 vols. 1763)—an unsuccessful attempt to establish a middle way between the orthodox and the federalists.

Other writings translated are *Conciliatory Animadversions on the Controversies agitated in Britain under the Names of Antinomians and Neonomians* (Glasgow, 1807), *Dissertations on the Creed* (Edin. 1823), and on the *Lord's Prayer* (1839).

Witt, DE. See DE WITT.

Wittenberg, a town of Prussian Saxony, till 1873 a fortress of the third rank, on the Elbe (here 800 feet wide), 59 miles SW. of Berlin. It is interesting as having been the capital of the electorate of Upper Saxony, as the cradle of the Reformation, and as containing the graves of Luther and Melanchthon. The famous university (1502), where Luther was professor and Hamlet studied, is now removed, and since 1815 incorporated with that of Halle. In the *Stadt-Kirche* are two remarkable pictures by Cranach, in which Melanchthon is represented as administering the sacrament of baptism, and Luther as preaching to a congregation of which the two foremost figures are his wife and son. In the *Schloss-Kirche* (1499) are the tombs of Luther and Melanchthon, as well as those of Frederick the Wise (with a noble bronze statue by Vischer) and John the Steadfast, electors of Saxony. Luther nailed his theses to its wooden door, which, burned by the Austrian besiegers in 1760 during the Seven Years' War, was in 1858 replaced by one of bronze bearing the Latin text of those theses. The *Schloss-Kirche* was restored and reopened by the German emperor on 31st October 1892—the occasion of a great Luther celebration. The Augustinian monastery, with Luther's cell, was converted in 1817 into a theological seminary; and the house of the great Reformer, containing his chair, table, &c., and two portraits of him by Cranach, remains almost unaltered. The houses of Melanchthon and Cranach are also shown. In the market-place is Schadow's bronze statue of Luther (1822), not far from which is Drake's of Melanchthon (1865), and outside the Elster Gate an oak marks the spot where Luther burned the papal bull. The fortifications were repaired by Napoleon in 1813 and occupied by the French; but it was besieged by the Prussians, and stormed by them 13th January 1814. It became permanently Prussian with the rest of Prussian Saxony in 1815. Manufactures are carried on of woollen and linen goods, hosiery, leather, brandy, and beer. Pop. 13,856. See works by Meyner (1845) and Schild (1883).

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Africa, in which a German trading company acquired rights in 1886, but, as in some respects dependent on Zanzibar, put under British protection as part of the Imperial British East Africa Company by the agreement in 1890 between Britain and Germany.

Witwatersrandt. See JOHANNESBURG.

Woad (*Isatis*), a genus of plants of the natural order Cruciferæ, containing only a few species, mostly natives of the countries around the Mediterranean. Dyer's Woad (*I. tinctoria*) was formerly much cultivated both in England and Scotland for the sake of a blue dye obtained from its root-leaves. The use of this dye was practically superseded by indigo. Dyer's woad is a biennial plant, with oblong crenate root-leaves about a foot in length, on pretty long stalks; an upright, much branched leafy stem, about 3 feet high; small yellow flowers, and large seed-vessels, about half an inch long and 2 inches wide, hanging from slender stalks. The leaves when cut are reduced to a paste, which is kept in heaps for about fifteen days to ferment, and then formed into balls which are dried in the sun, and which have a rather agreeable smell, and are of a violet colour within. These balls are subjected to a further fermentation before being used by the dyer. When woad is now used, it is always in union with indigo, which improves the colour. Even by itself, however, it yields a good and very permanent blue. In 1892 woad was grown at only four places in England (mostly near Boston); the price, formerly £25 a ton, had sunk to £9. It is supposed that woad was *vitrum*, the dye with which Cæsar said almost all the Britons stained their bodies. For the method of growing woad, see Arthur Young's *Agricultural Survey of Lincolnshire* (1799).

Dyer's Woad (*Isatis tinctoria*).

Woburn, a small market-town 13 miles SW. of Bedford, noted chiefly for Woburn Abbey, seat of the Dukes of Bedford, which stands in a park 12 miles in circumference. The Cistercian abbey, a daughter house of Fountains, was founded in 1145, and rapidly became powerful. It and its lands were granted in 1547 to John, Earl Russell, afterwards Duke of Bedford. Of the abbey nothing now remains; the mansion, built mainly in the 18th century, occupies four sides of a quadrangle, and contains a magnificent collection of portraits. Pop. 1300.

Woburn, a town of Massachusetts, 10 miles by rail NNW. of Boston, with manufactures of pianos, shoes, leather, &c. Pop. (1890) 13,499.

Woden. See ODIN.

Wodrow, ROBERT, church historian, was born at Glasgow in 1679. He entered the university there in 1691, and, after passing through the arts classes, studied theology under his father, who was professor of divinity, and had suffered for conscience' sake during the persecution. He discharged at the same time the duties of college librarian, till in 1703 he was licensed to preach, of Eastwood. He married in 1708, and h children; refused calls to Glasgow (Stirling (1726); and died 21st March 17 row's writings, which fill close on fifty MS., are faithful and laborious, if heav sided, compilations. One only of them lished in his lifetime—the *History of the of the Church of Scotland from the Rest the Revolution* (2 vols. fol. 1721–22), dedicated to George I., 'the best and g kings,' and earned him in 1725 a gra guineas. The others include *Lives of th Reformers and most eminent Ministers* (2 vols. Maitland Club, 1834–45), *Anale History of Remarkable Providences* (4 v land Club, 1842–43), a selection from *spondence* (3 vols. Wodrow Society, 1842 *Biographical Collections relating to the of Scotland* (New Spalding Club, 1890).

See the Memoir by Dr R. Burns prefixed to of the History (4 vols. 1830), and others by t M'Crie and R. Lippe to the two last-named wo

Woffington, MARGARET, actress, daughter of a Dublin bricklayer, October She grew up a girl of remarkable grace an and, still a child, became a pupil of Violante, mistress of a rope-dancing boot seventeen to twenty she played on th stage all manner of parts, from Opheli Harry Wildair, and on 6th November 1 her first appearance at Covent Garden as the *Recruiting Officer*. Her beauty and pretty singing and vivacious coquetry, exquisite art especially of her male c carried all hearts by storm. Her one was the harshness of her voice, yet th degree hindered the completeness of her Her character was far from irreproacha it is most probable that Garrick never seriously of marrying her. But she aton her faults by an irresistible goodness of tion, and by a charity that knew no boun sister Mary failed as an actress, but Captain Cholmondeley, nephew to Horace and survived till 1811. Peg Woffington wa singularly independent and something w in her moods, but she kept the affectio public till the tragic close of her career. May 1757 she broke down in playing and left the stage for ever. She died at ton, 28th March 1760, her last days charity, good works, and penitence. Sh noble monument to her memory in her aln at Teddington.

See the Lives by Augustin Daly (New York, J. Fitzgerald Molloy (1884); also R. W. Lowe' of Dr Doran's *Annals of the English Stage* (3 vo Charles Reade's *Peg Woffington* is a clever novel but is hardly successful as a living realisation of larly bright and interesting personality.

Wöhler, FRIEDRICH. See CHEMISTRY,

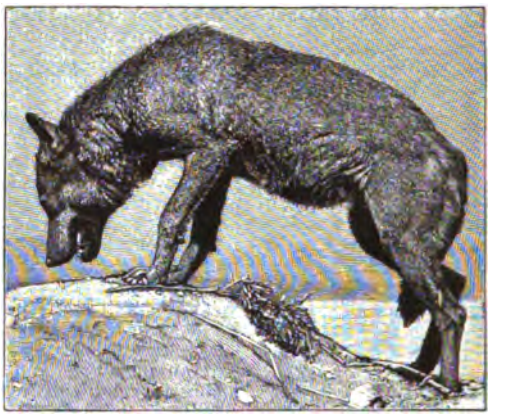
Woiwode, or VOIVODE (Polish *wo* Servian *vojvoda*, Russian *voevoda*), a Slav for the leader of an army; later used administrative ruler of a province, or, as f in Moldavia and Wallachia, the reigning pr

Woking, a market-town of Surrey, 2 SW. of London by rail, with an old church English and Decorated; restored 1878). 3 miles west is the 'London Necropolis Cer (1864), 2000 acres in extent, to which funera come regularly from London. Near was bu first public crematory in England (1878). miles NW. of Woking is Bisley Common 1890 the shooting headquarters of volu removed from Wimbledon. Pop. of parish,

of Berkshire (till 1832 Wiltshire, detached), in Windsor Forest, 7 miles SE. of Reading by rail. Incorporated as a municipal borough in 1885, it has a Gothic town-hall (1860), neighbouring paper, saw, and flour mills, and the 'Rose' inn, where, once detained by wet weather, Gay, Swift, Pope, and Arbuthnot celebrated the host's pretty daughter in the ballad of 'Molly Mog.' It was famous for its bull-baitings till 1821. Bearwood, 1 mile W., is the seat of J. Walter, Esq., of the *Times*. Pop. (1851) 2272; (1891) 2060.

Wolcot, Dr John, better known under the pseudonym of 'Peter Pindar,' was born at Dodbrooke, near Kingsbridge, Devonshire, in May 1738. He was educated at Kingsbridge, at Bodmin, and in Normandy at the charge of an uncle, a surgeon of the little Cornish seaport of Fowey; and then, having studied medicine for seven years under him, walked the London hospitals, and taken his M.D. at Aberdeen (1767), he went to Jamaica as medical attendant to the governor, Sir William Trelawny. He made Wolcot physician-general of the island, and, to be able also to give him a good living, sent him home to England to procure ordination from the Bishop of London (1769). Three years later, however, he died, whereupon Wolcot forsook both Jamaica and the church, and started a practice at Truro. Here he discovered the talents of young Opie (q.v.), and with him in 1780 he removed to London, thenceforth to devote himself to writing audacious squibs and satires in verse on all sorts of persons, from George III. down to the city liverymen and even lower. His sixty or seventy poetical pamphlets (1778–1818) include *The Lousiad*, *The Apple-dumplings and a King*, *Whitbread's Brewery visited by their Majesties*, *Bozzy and Piozzi*, and *Lyrical Odes* on the Royal Academy exhibitions (Wolcot himself was no mean draughtsman). Witty and fluent, but coarse and ephemeral, they have long since outlived their vogue, which was great, for in 1795 he obtained from the booksellers an annuity of £250 for the copyrights. More than this, the ministry are said by Wolcot himself to have endeavoured vainly to bribe him into silence. Blind for some years, he died at Somers Town, 14th January 1819. See *Blackwood's Magazine* for July 1868.

Wolf, the vernacular name of certain species of the genus Canis; for a general account of which see Dog. The principal forms included in this section are as follows. (1) The Common Wolf (*C. lupus*) has very much the appearance of a large, long-legged, bare-boned dog, with a long tail, which hangs over its haunches instead of being curled upwards. Distinguishing characters are to be found in the lank body, length of the snout in proportion to the head, sloping forehead, oblique eyes, and erect ears. The fur varies according to the climate with respect both to its nature and colour. In the north it is long and thick—longest on the belly and legs, bushy on the tail, and erect on the neck and sides—whilst in the south it is generally shorter and rougher. The colour is usually pale yellowish gray mingled with black, lighter, often whitish gray below. It undergoes some change with the season, inclining to red in the summer, in the winter to yellow, which becomes white in the north; it is of a darker hue in the south. The forehead is whitish gray, the snout yellowish gray, always mingled with black, the lips whitish and the cheeks yellowish, sometimes indistinctly striped. A full-grown wolf measures 5 feet 5 inches in length, whereof 18 inches belong to the tail; its height is 33 inches, and its weight 50 kilos (over 100 lb.). The wolf's natural dogs it will learn to bark. Wolves inhabit a great variety of country, both hill and plain, especially thick forests and broken ground, with alternate morasses and dry patches, and in the south the steppes. They shelter in woods, marshes, canebrakes, and maize-fields, roaming over wide areas, often suddenly appearing where none have been seen for years, and as quickly vanishing—nor is this wonderful when it is remembered that they will cover from 25 to 40 miles in a single night.



The Common Wolf (*Canis lupus*).
(From a Photograph by Anschütz.)

In the neighbourhood of dwellings they only appear after twilight, but in secluded places carry on their hunting all day. Their food varies according to the season, consisting in summer almost exclusively of wild animals—foxes, hedgehogs, mice, birds, reptiles, and even vegetables; of larger animals, elk and deer, whilst hares are soon exterminated where wolves abound. They follow the herds of lemmings in their migrations, and will devour carrion with avidity; but they do not appear to attack man unless in large numbers or pressed by hunger. In winter they approach nearer to human habitations, doing much damage to flocks and poultry yards; they come into the outskirts of St Petersburg and Moscow, and even pass through the streets of such towns as Agram. When in packs they will attack horses and horned cattle. In the chase the wolf exhibits all the cunning of the fox, and in addition courage and the capability of hunting in packs. These will even divide into parties, one following the trail of the quarry, the other endeavouring to intercept its retreat. In mental qualities the wolf is in every respect the equal of the fox; his caution is so great that he regards every unfamiliar object with suspicion, will not pass through a door if he can leap over the wall, and will not, unless famished, attack a tethered animal lest it should be the bait of a trap. When he sees himself captured his courage and ferocity at once forsake him, so that we may readily credit Conrad Gesner's story of an old woman, a wolf, and a fox falling successively into a pitfall, and each keeping aloof from the others. The loss in life and property caused by wolves is in many places considerable; in Russia, where their number is estimated at 170,000, 203 persons were recorded in 1889 as having fallen victims to them, whilst the annual damage done to live-stock has been variously stated at from 7 to 15 million roubles (say from £700,000 to £1,500,000), and to useful wild animals at no less than 50 million roubles. In Lapland the word for peace is synonymous with security from wolves.

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Hence it is not wonderful that these animals are universally detested, and that the chase for them is vigorously pursued, 10 roubles being paid for each one killed in Russia. In France, where they are found chiefly in the central and south-western departments, £4 is paid for the destruction of a full-grown animal, and £1, 12s. for a cub; and in 1883 as many as 1316 were killed; in 1889, 515; in 1890, 461; and in 1891, 404 (149 full-grown, 255 cubs; premiums paid, £1013—including extra sums for females big with young).

In spring and summer wolves are solitary or in pairs, in the autumn in families, and in winter in packs. The pairing season is in December and January, when the males fight savagely together; those who are fortunate enough to secure a mate remain with her till the young are well grown. The period of gestation is sixty-three days, and from three to nine (usually four to six) cubs are found in a litter; these are blind for twenty-one days, and are suckled for two months, but at the end of one month are able to eat half-digested flesh, disgorged for them by the mother. They quit the parents in November or December, but many remain together six or eight months longer; they are full grown in three years, and live from twelve to fifteen years. The stories of children having been brought up by wolves (Sleeman's *Journey through Oudh*, 1858, gives several such) require further confirmation. Wolves can readily be tamed when taken young, and then exhibit all the characteristics of domestic dogs. F. Cuvier tells of one presented by its master to the Jardin des Plantes, which recognised him with every manifestation of joy after intervals of one and a half and three years.

Notwithstanding the spread of civilisation, the wolf is still widely distributed. Excluding thickly populated regions, it extends over almost the whole of Europe; it is not unfrequent in Spain, Greece, and Italy, as well as France. So recently as 1885–86 no less than thirty-nine were killed in Alsace-Lorraine and two in the Rhine Provinces. It is rarer in Switzerland, and in mid and north Germany has been exterminated, as in Britain. Eastern Europe, Russia, and Scandinavia are the only parts where it now occurs in any large numbers. It never seems to have existed in Iceland, or in the islands of the Mediterranean. In Asia it is spread over all the centre and north-east, over Afghanistan and Beluchistan to Sind, and possibly over the higher Punjab. The distribution of the North American variety will be given below. In Britain it appears from geological evidence that the wolf must have existed in almost every county. Hunting it was a favourite pastime among the ancient Britons and Anglo-Saxons. In the reign of Athelstan one Acehorn built a refuge for wayfarers near Filey in Yorkshire; and the tribute of 300 wolf-skins annually levied by Edgar on the Welsh is a matter of common repute, though it did not cause the extermination of these animals, as is sometimes stated, for we find that Henry III. granted lands on condition of the wolves being destroyed. Three shillings were paid for three wolves killed near Lichfield in 1334; Nottinghamshire was infested as late as the eleventh year of Henry VI.; but no mention of them in England occurs after the reign of Henry VII. (1485–1509). In Scotland we have the well-known story of Sir Ewen Cameron of Lochiel killing the last in the country in 1680; but there is reason to believe that individuals existed in Sutherlandshire, as also on the Findhorn River till 1743. In Ireland we have a proclamation forbidding the export of wolf-dogs in 1652, and the ultimate disappearance of wolves has been placed about 1766.

The following forms, which appear to be varieties of the common wolf, have been at different times described as distinct species: (*a*) *C. niger* is based on two specimens, formerly in the possession of the Zoological Society, obtained by Lieutenants Kinloch and Biddulph in Tibet in 1887. Their distinctive marks are said to be shaggy fur, which is black, except for a white muzzle, feet, and patch on the breast. (*b*) *C. chanco* (probably = *C. laniger*, Hodgson) is a pale variety from Chinese Tartary. Hodgson says it is common in Tibet. (*c*) *C. pallipes* is said to be smaller and slighter than the typical form, with little or no under-fur; but undoubted examples of *C. lupus* differ as much from each other as this does from them. It inhabits the plains south of the Himalayas, but is rare west of the Indus. It does not hunt in large packs, but in numbers of six or eight at most. The superstition of the people prevents its destruction, for they imagine that its blood will diminish the fertility of the fields. It is seldom heard, not howling like the European wolf. It is remarkable even among wolves for speed and endurance. (*d*) *C. occidentalis* (the American Wolf) is less red and blacker on the back, though not to so great an extent as many Spanish wolves. Formerly it was very numerous in the plains, hanging on to the herds of bison, killing weaklings and calves. Sometimes it is very ferocious, even attacking man, but nevertheless has been known to satisfy its hunger with berries. It inhabits burrows with several openings. As late as 1870 it was found in Massachusetts, but at the present day it is found east of the Mississippi and south of Canada only in unsettled parts of south New England, New York state, the Alleghanies, and the south of Florida, and possibly the south of Ohio; it is abundant only in remote districts of Maine. North of this it is still quite common, extending as far as Greenland. Its southern limit seems to be the province of Guanajuato in Mexico. (*e*) *C. hodophylax* (the 'Jamaina' of the Japanese) inhabits the woody and mountainous parts of Japan, where it hunts in small packs or families, and is much dreaded by the natives. It is of small size, and has short legs and an elongated muzzle. (*f*) *C. lycaon* is a name which has been given to the European black variety.

The following may be regarded as distinct species: (2) *C. simensis* (Abyssinian Wolf), described by Rüppell from specimens captured in the mountains of Semyen (Simen), is as large as a big sheep-dog, and has a very long muzzle. It is of a pale reddish brown, lighter below; white round the mouth and eyes, the margins of the ears, chest, and forepaws; the end and upper part of the tail are black. It does not appear ever to attack man.

(3) *C. antarcticus* (the Antarctic Wolf) is an inhabitant of the Falkland Islands, and much alarmed the early explorers by its bold approach, which was, however, merely the confidence due to unfamiliarity. Darwin tells us that at the time of the visit of the *Beagle* they would steal meat from under the head of a sleeping man, whilst the gauchos would kill them by holding out a piece of meat in one hand and a knife in the other. They feed on the native geese, and burrow like foxes. They are solitary, and are silent except in the breeding season. The fur is moderately long, of a yellow colour speckled with black, paler below; the lips, chin, and throat are white, but the most characteristic mark is a black patch just above the heel.

(4) *C. jubatus* (Maned Wolf) is the largest of its family in South America. It occurs in Paraguay and adjoining regions, and is easily distinguished by its long limbs and large ears. It has longish hair of a bright yellowish red, and a stripe of black down the middle of the neck, which, however,

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scarcely deserves the name of 'mane.' There is a black patch below the jaw and on each foreleg; the front of the throat and end of the tail are white. It inhabits low moist localities, and is said not to be dangerous to man or to domestic animals, except perhaps sheep. Its local name is 'A-gua-a,' perhaps from its cry.

(5) *C. latrans* (Prairie Wolf or Coyote) has now been extirpated over large tracts in Kansas, Nebraska, &c., but it may still be found where the common wolf has disappeared, owing to its smaller size and less dangerous character. It extends as far as 55° N. lat. and southwards to Costa Rica, and is abundant in northern Mexico, New Mexico, and Texas. Its colour varies with the season, being a bright tawny brown in summer and grayish or quite gray in winter. It has black stripes along the back and across the shoulders and hips; it is dingy white below, and tawny above the muzzle and outside the ears and legs. It is really a slender animal, but looks stout by reason of its thick coat. It causes much annoyance by its howling in the night, two or three producing the effect of ten by their numerous notes and their uninterruptedly succeeding each other. It eats all kinds of animal substances, and is the scavenger of hunting and travelling parties. In autumn it devours the prickly pear fruit, and in winter cranberries. Its cunning is so great that it is difficult to trap, and hence is killed by poisoning a bait, made more attractive by asafœtida. It will not attack man unless wounded. It breeds in retreats among the rocks, five or six, rarely ten, young being born in May or June.

C. lupus has been found fossil in Pleistocene deposits in various parts of Europe. An allied extinct form is *C. cantleyi* of the Indian Pliocene, probably the ancestor of *C. pallipes*. *C. nescherensis*, from the Upper Pliocene of France, is a smaller form; and *Lycorus*, from the French Pleistocene, is evidently a wolf, though it has only three premolar teeth.

For further information, see FURS; Mivart, *Dogs, Jackals, Wolves, and Foxes* (1890), with admirable coloured figures; Huxley, 'On the Cranial and Dental Characters of the Canidæ,' in *Proc. Zool. Soc.* (1880): Harting, *British Animals extinct within Historic Times* (1880). For a discussion of the rearing of children by wolves, see V. Ball's *Jungle Life in India* (1879).

Wolf, FERDINAND, a great Romance scholar, was born at Vienna, December 8, 1796, studied philosophy and jurisprudence at Gratz, then accepted a post in the royal library at Vienna. He took an active part in the foundation of the Academy of Sciences, and died February 18, 1866. Among his books were *Floresta de rimas modernas Castellanas* (2 vols. 1837), *Ueber die Lais, Sequenzen und Leiche* (1841), *Studien zur Geschichte der Spanischen und Portugiesischen Nationallitteratur* (1859), and *Histoire de la Littérature Brésilienne* (1863). Together with C. Hofmann he edited a collection of the oldest Spanish romances, *Primavera y flor de Romances* (2 vols. 1856). Besides he made numerous contributions of the greatest value on questions of Romance scholarship to the Vienna *Jahrbücher der Litteratur*, most of which were also dispersed as off-prints. He also contributed notes to the German translation of Ticknor's *History of Spanish Literature*, and left a supplement to it which was edited by his son (1867), who also printed a selection from his father's learned correspondence.

Wolf, FRIEDRICH AUGUST, the most gifted classical scholar and first critic of his age, was born at Hainrode near Nordhausen, 15th February 1759, son of the village schoolmaster and organist. His father removing to Nordhausen, he was sent to the gymnasium there, but his real education he gave himself with a zeal almost unparalleled in the annals of human learning. While still a schoolboy, besides a wide range in classical reading, he had mastered French, Italian, Spanish, Hebrew, and English, and perfected himself in the theory and practice of music. In April 1777 he went to the university of Göttingen, and inscribed himself in the matriculation-book as 'student of philology,' the first instance at any university. 'The matriculation was an epoch in German education,' says Mark Pattison. He attended the lectures very irregularly, being already much given to private study. For the rest he led a very retired life, was little visited or known, and was intimate only with a few. From Heyne, who once excluded him from his lectures on Pindar for his former irregularity, he kept himself quite aloof. That overpraised scholar coldly returned him the dissertation he laid before him in 1779, containing some novel views regarding the Homeric poems. The same year Wolf went as teacher to the Pædagogium at Ilfeld, and there first established his fame by an edition of the *Symposium* of Plato, with notes and introduction in German. In 1782 he was appointed to the rectorship of the High School at Osterode, in the Harz; and in 1783 he accepted an invitation to Halle as professor of Philology and Pädagogik. Here he spent twenty-three delightful years, giving a new meaning to philology, which he defined as 'knowledge of human nature as exhibited in antiquity.' As a science of interpretation it embraces literature, art, and, indeed, anything distinctly characteristic in the life of antiquity. At first he rather estranged than attracted students by the high tone of his teaching. However he learned to adapt himself to his audience, and was soon surrounded by a crowd of eager pupils. In his famous *Seminarium* he lavished all the stores of his mind upon his pupils, giving them also a brotherly sympathy and comradeship that aroused their enthusiasm. Three of his pupils were especially dear to him, Heindorf, Immanuel Bekker, and August Böckh. Before all things a teacher, literary labours and fame he looked upon more as a subordinate object, and all his writings were written merely on the spur of occasion and necessity. Yet he established his reputation as a scholar and critic by an edition of Demosthenes' *Oratio adversus Leptinem* (1789), and still more by his celebrated *Prolegomena ad Homerum* (1795), in which he unfolded, with equal erudition and acuteness, his bold theory that the *Odyssey* and *Iliad* are composed of numerous ballads by different minstrels, strung together in a kind of unity by subsequent editors. He maintains (1) that the Homeric poems were composed without the aid of writing, which was impossible for literary purposes about 950 B.C.; that they were handed down by oral recitation, suffering many changes in the process; (2) that the poems suffered many more changes after they were written down (*c.* 550 B.C.), made by revisers (διασκευασταί) or by learned critics with critical theories of their own; (3) that there is an artistic unity in the *Iliad*, still more in the *Odyssey*, but this is not due to the original poems, but the effect of the later redactions; (4) that the original poems, from which they have been put together, were not all by the same author. Yet he does not deny a personal Homer, but believes him a sovereign genius who 'began the weaving of the web.' This work made a great sensation through the whole of Europe. Some scholars gave out that they had long entertained similar notions regarding the Homeric poems; and Heyne insinuated that the Prolegomena were only a reproduction of what Wolf had heard at Göttingen. This gave rise to the spirited *Briefe an Heyne* (1797), of which the first three

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especially are models of scholarly polemic and fine irony. In 1801 Wolf confirmed by an exhaustive inquiry the suspicions, first broached by Markland in England, of the genuineness of the four orations of Cicero: *Post reditum in Senatu, Ad Quirites post reditum, Pro domo sua ad pontifices, De haruspicum responsis.* He next demolished the authenticity of the oration *Pro Marcello* (1802), which had long been studied by the Ciceronians as a model of eloquence and style. He refused a call in 1796 to Leyden, in 1798 to Copenhagen, and in 1805 to Munich, but after the disasters of 1806 the university at Halle was dispersed, and Wolf was for a time reduced to great straits. He soon, however, became member of the Academy of Sciences at Berlin, where he took an active part in the reorganisation of the university, and was appointed a professor. He also received a post in the department for public instruction; but his administrative work proved a complete failure from his absoluteness and lack of tact, and, still worse, even in the lecture-room he seemed to have lost all the attractiveness and fire of his Halle days. He quarrelled with everybody—with Buttmann, even with Heindorf; Schleiermacher nicknamed him the 'distinguished Eremite.' His health began also to give way, and he took a journey to the south of France in April 1824, and died at Marseilles, 8th August 1824.

While in Berlin he edited along with Buttmann the *Museum der Alterthumswissenschaften* (1807–10), and afterwards the *Litterarische Analecten* (1817–20), perhaps the best philological journal that has ever been published. From the papers which he left his son-in-law, Körte, published *Ideen über Erziehung, Schule und Universität* (1835). Wolf never completed the greater part of his literary projects, and even his published writings remained splendid torsos. The *Darstellung der Alterthumswissenschaft* (1807) is his most finished work. His *Kleine Schriften* were edited by G. Bernhardy in 1869. See Hanhart, *Erinnerungen an Fr. Aug. Wolf* (1825); Körte, *Leben und Studien Fr. Aug. Wolf's des Philologen* (2 vols. 1833); Arnoldt, *F. A. Wolf in seinem Verhältniss zum Schulwesen* (2 vols. 1861–62); and Mark Pattison's *Essays* (vol. i. 1889)—the best account of Wolf in English.

Wolf, or WOLFF, JOHANN CHRISTIAN VON, philosopher and mathematician, was born a poor tanner's son at Breslau, 24th January 1679. At Jena he studied theology, but much more mathematics and philosophy, especially the writings of Descartes and Tschirnhausen. His annotations to the *Medicina mentis* of the latter brought him into connection with Leibnitz. In 1703 he began to give lectures at Leipzig in mathematics and philosophy, and when the incursion of Charles XII. into Saxony drove him from Leipzig he was called to Halle, on the recommendation of Leibnitz, to the chair of Mathematics and Natural Philosophy. His system of metaphysical and moral philosophy, worked out according to strict mathematical method, quickly spread through Germany, but Wolf was violently attacked by his pietistic colleagues in Halle, declared to be a despiser of religion, and a teacher of error, and formally accused to the government. The immediate ground of the accusation was an oration 'On the moral philosophy of the Chinese,' in which he spoke with approval of the morality of Confucius; but moreover the basest insinuations were brought against him as an advocate of anarchy. The Prussian king, Frederick-William I., was prejudiced against him by an argument that appealed to him. 'What does this pre-established harmony mean?' asked the king in his tobacco-parliament. 'It means,' was the reply, 'that if your tallest grenadier runs away, he can, properly speaking, not be justly punished, because his running away is, indeed, merely a piece of the pre-established harmony.' By a cabinet decree of November 15, 1723, Wolf was ordered on pain of death to quit Halle in twenty-four hours, and the Prussian dominions in two days; he was warmly received in Cassel, and appointed to a chair in Marburg. The dispute about his philosophical system now became general, and all Germany took part either for or against him, the victory ever inclining more and more to Wolf. Frederick the Great recalled him on his accession (1740) to be professor of the Law of Nature and Nations, and in 1743 he became chancellor of the university, and was raised to the rank of Baron of the Empire by the Elector of Bavaria during the regency. He died at Halle, April 5, 1754. Before his death he saw his philosophy spread over the whole of Germany and a great part of Europe; but he had outlived his reputation as an academical teacher. Wolf systematised and popularised the philosophy of Leibnitz, but his great fundamental principle of inlying purpose by Wolf was vulgarised and weakened into external utility. His *Theologia Naturalis* treats at immense length the existence and attributes of God, and gave an impulse to that development of natural theology and rationalism which soon almost drove out revelation by rendering it unnecessary. He did not intend to question the fact of a historical revelation, but he made it impossible by the criteria of revelation which he established, and Reimarus and the thinkers of the *Aufklärung* made the further step. The Wolfian philosophy held the world until the rise of Kant; and an important section of Kant's work was a destructive criticism of Wolf's dogmatism.

Wolf's works on philosophy fill twenty-two quarto volumes. See *Christian Wolfs eigne Lebensbeschreibung*, ed. by Wuttke (1841); the 18th-century books of Ludovici; and works cited at KANT.

Wolfe, CHARLES, was born at Dublin, 14th December 1791. On the death of his father, a Kildare gentleman, the family came to England, and the boy received his chief education at Winchester. In 1809 he entered the university of Dublin, gained a scholarship, and in 1814 took his B.A. In 1817 his *Burial of Sir John Moore* was suggested by Southey's impressive account of it in the *Edinburgh Annual Register*, and soon after found its way anonymously into the newspapers. So admired was the poem that even whilst the name of its author remained unknown, and it was ascribed to Campbell, Byron, &c., it had won for itself a secure place in the heart of the nation. Wolfe in 1817 became curate of Ballyclog, in Tyrone, and then rector of Donoughmore. Symptoms of consumption appearing, he tried in search of health, successively, England, the south of France, and finally the sheltered Cove of Cork, and here he died, 21st February 1823. His literary *Remains*, consisting of sermons chiefly and poems, were published with a memoir in 1825 by Archdeacon Russell.

Wolfe, JAMES, the conqueror of Quebec, was born at Westerham vicarage, Kent, on 2d January 1727. He came of mixed Welsh-Irish-Yorkshire ancestry, the eldest son of General Edward Wolfe (1685–1759), an officer of merit and distinction, who served under Marlborough, and the beautiful Henrietta Thompson (1704–64). With his younger brother, Edward (1728–44), he was educated at Westerham and Greenwich. From the first he was bent upon following his father's profession of arms; and, balked by illness at thirteen of a share in the unfortunate Cartagena expedition, in 1742 he received an ensign's commission in a foot regiment. In 1743 he took part in the famous battle of Dettingen, boy though he was, as adjutant of his regiment; in 1744 he obtained his captaincy; and in 1745–46 he served against

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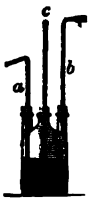
the Scotch rebels, being present at the battles of Falkirk and Culloden. Again abroad on service in 1747, he was wounded, though not seriously, at the battle of Lawfeldt, and so distinguished himself that he was publicly thanked by the Duke of Cumberland. From 1749 to 1757, with occasional interruptions, such as a six months' residence in Paris, he was engaged in garrison duty in Scotland and England; his interesting correspondence with his mother shows that he had no great liking for the former country and its inhabitants. In the mismanaged expedition against Rochefort (1757) Wolfe acted as quartermaster-general. The total failure of the operations brought disgrace to nearly all concerned; but it became known that had Wolfe's counsels been followed the result would almost certainly have been different. Pitt's attention was now first decisively drawn to him as an officer of whom great things might be expected; and in 1758, with the full rank of colonel, he was appointed to the command of a brigade in the expedition against Cape Breton under General Amherst. A brilliant success was obtained in the capture of the strong fortress of Louisburg (q.v.) after a seven weeks' siege; that it was mainly due to Wolfe's skill, boldness, and activity was clearly understood, and he became popularly known as the 'Hero of Louisburg.' Pitt was now organising his grand scheme for expelling the French from Canada; he 'sought for merit wherever it was to be found;' and the expedition which had for its object the capture of Quebec, the enemy's capital, he confided to Wolfe's command, allowing him, as far as possible, a *carte blanche* in the choice of his subordinate officers. Advanced to the rank of major-general, and commanding 9000 men, Wolfe sailed from England on 17th February 1759, and on 26th June landed his forces on the Isle of Orleans, opposite Quebec. The attack, to which he had looked forward as 'a very *nice* operation,' proved one of stupendous, indeed nearly hopeless difficulty. The system of defence adopted by his adversary, the skilful and wary Montcalm (q.v.), was such as to offer no point of advantage. In all his attempts, though seconded most ably by Admiral Saunders, who commanded the fleet, Wolfe found himself completely foiled. The season wore fast away during which operations could be continued; but at last, having dropped down the river, and scaled the cliffs at a point insufficiently guarded—a feat of such frightful risk as in war has scarcely a parallel—at the day-dawn of 13th September Wolfe found himself on the Plains of Abraham, where, his supplies thus cut off, Montcalm had no choice but to give battle. The forces were probably equal, between four and five thousand men; but Wolfe had no doubt of victory, and the result justified his confidence. After a short struggle the French were driven from the field in complete rout; Montcalm was one of 500 killed; the capitulation of Quebec followed five days after; and its fall decided the fate of Canada. Wolfe died in the hour of victory. In person he led the right, until, thrice wounded, he was carried to the rear. He lived to hear the cry, 'They run! see how they run!' and expired with the words, 'Now God be praised, I will die in peace.' His body was brought home and buried in Greenwich church, and a monument was erected to him in Westminster Abbey. He was only thirty-two; his health had always been bad, and yet he stands among the first half-dozen of our English generals.

See his *Life and Correspondence* by Robert Wright (1864), and *Montcalm and Wolfe* by Parkman (1885).

Wolfenbüttel, an old town of Brunswick, on the Oker, 7 miles S. of Brunswick by rail. One of the old churches contains many of the tombs of the princes of Brunswick. The old castle now accommodates a seminary for teachers and a theatre. The library opposite, built in 1723 in the form of the Pantheon at Rome, became famous for its literary wealth and for the fact that Lessing was its librarian. It was Lessing who edited the 'Wolfenbüttel Fragments,' professedly from anonymous MSS. under his charge, but really from the pen of his friend Reimarus (q.v.), which startled the theological world of Germany. The Pantheon building had become so rickety and dangerous that it had to be taken down, being superseded in 1887 by a handsome new edifice, which houses 300,000 volumes (including 800 Bibles and a large number of incunabula) and 10,000 MSS.—one of them the 14th-century manuscript of Fordun's *Scotichronicon* stolen by M. Flacius Illyricus. There are in the town manufactures of machines, copper goods, flax, cloth, corks, leather, preserves, tobacco, &c.; pop. (with garrison) 13,453. The place is very ancient, and dates from 1046; it was besieged and taken in 1193 and 1542; and during the Thirty Years' War a battle was fought here in 1641. See a work on the town by Bege (1834) and on the library by Heinemann (1886).

Wolff, Joseph, D.D. (1795–1862), a German Jew who turned Roman Catholic in 1812, but came to England and entered the Anglican Church in 1819, becoming a missionary to the Jews in the East. He made many journeys in Persia, Egypt, India, and Abyssinia; but his most notable and adventurous journey was to Bokhara (1843), to inquire as to the fate of Conolly and Stoddart. He published accounts of his journeys and missionary labours, including the *Mission to Bokhara* (1845), and his *Travels and Adventures* (2 vols. 1860), an autobiography. He married a daughter of the Earl of Orford, and died vicar of Isle-Brewers, Somerset.

Wolffian Bodies (named after the embryologist K. F. Wolff, 1733–94), the primordial renal organs in the embryo of the higher vertebrates, performing the functions of kidneys till superseded by the true or permanent kidneys. In man they appear towards the end of the first month of fœtal life; from the third month they begin to disappear, and at birth hardly any traces are to be seen, but in the male their ducts become the excretory ducts of the testes. In fishes, on the other hand, they remain and are the permanent renal organs.



Wolffian Bottles.

Wolffian Bottles, or Woulfe's Bottles, bottles like that in the figure, named from the London chemist Peter Woulfe (1727–1806). They are used for the purpose of purifying gases, or of dissolving them in suitable solvents. The gas is passed in at the tube, *a*, which dips below the surface of the liquid, and as it bubbles through is either dissolved or passes on to a second bottle by means of the tube, *b*. The neck through which *c* passes may be fitted either with a cork or with a tube as shown, admitting air so as to prevent undue rarefaction.

Wolf-fish, or Cat-fish (*Anarrhichas lupus*), a fish related to the blennies, common in north temperate seas, and not unfrequent on northern British coasts. It is famous for its ferocious appearance and habit. The stout body is usually about 3 feet in length, but may be a foot or two more; the massive head has a blunt profile, and the open mouth, with its formidable teeth, is suggestive of a carnivorous mammal; the skin is slimy, and bears only rudimentary scales; the general colour is brownish gray, crossed by about a dozen dark bands, and spotted; the dorsal and anal fins are long, the pelvic fins are absent. The teeth are

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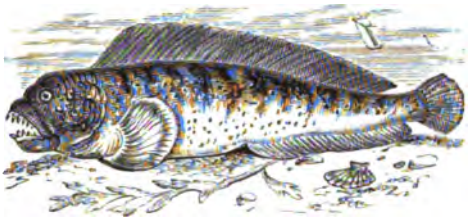
very remarkable, those in front like canines, those on the sides of the lower jaw tubercled, those on the palate pavement-like. They are adapted for seizing and crushing molluscs, crustaceans, and sea-urchins. The wolf-fish is fond of rocky bottoms, but it is often caught where it is not



Wolf-fish (*Anarrhichas lupus*).

much wanted, on cod-lines. It bites savagely when caught, and is often destructive to nets. Its ferocious appearance and habits, and its peculiar smell, are responsible for a prejudice which prevents it from being justly esteemed as a food-fish, for as such it is certainly valuable and, according to some, 'delicious.' The thick skin is sometimes made into bags. On the Pacific coast of North America there is an even larger form (*A. ocellatus*), also of use as a food-fish.

Wolf-hound, or BORZOI, a breed of dog first imported in numbers into England from Russia about the year 1885. In shape the borzoi is like a gigantic greyhound, though covered with a soft coat about the length of a deerhound's. In Britain the breed has become very popular owing to the peculiar grace and beauty of the borzoi. Though

Wolf-hound, or Borzoi.
(From a Photograph by Gambier Bolton, F.Z.S.)

supposed to be able to attack and kill a wolf, in disposition and appearance the Russian wolf-hound is so excessively gentle that doubts have been cast on his powers. In recent trials with wolves in America the borzoi failed signally to accomplish the purpose for which he is intended.—The Irish wolf-hound was identical in shape and appearance with the Scottish deerhound. Attempts have lately been made to revive the breed, but it is admitted that pure specimens are no longer obtainable.

Wolfram. See TUNGSTEN.

Wolfram von Eschenbach, a mediæval German poet, born in the end of the 12th century, near Anspach in Bavaria. He lived some time at Eisenach at the court of Hermann, Count of Thuringia, where he met Walther von der Vogelweide. His death took place after 1215. Besides *Parzival* he left seven *Love Songs*, a short epic, *Willehalm*, and two fragments called *Titurel*. Wolfram's works, written in Middle High German, were held in great esteem down to the Reformation. The *Parzival* is an epic, having for its main theme the history of the Grail (q.v.). Composed between 1204 and the author's death, it is, if we except the popular national epics, such as the *Nibelungenlied*, the greatest poetical production of German literature during the middle ages. To this supreme position it is entitled in virtue of its high imaginative qualities, its poetic truth and beauty, and its pure and lofty ethical strain. Besides it is a valuable picture and symbol of the age in which the writer lived, a translation into language of the ideals and aspirations of chivalry in its noblest phases of existence. It has been translated into Modern High German by San Marte (1886) and by Simrock (1883), the latter version being the more faithful and accurate, but the more difficult to read. It was from this poem that Wagner derived the libretto for his magnificent opera *Parsifal*.

Wolf Rock, 8 miles SSW. of Land's End, has a lighthouse (1862–69) 116½ feet high.

Wolf's-bane. See ACONITE.

Wolf-spider. See TARANTULA.

Wolgast, a Pomeranian seaport, stands on the Peene, about 10 miles from its entrance into the Baltic, and 36 miles SE. of Stralsund by rail. Large ships cannot approach the harbour. The place, which has some manufactures and a pop. of 7485, was once strongly fortified; it was taken and retaken five times between 1628 and 1675; the Russians plundered and burned it in 1713, and the Swedes retook it in 1715.

Wollaston, WILLIAM, author of the *Religion of Nature*, was born at Coton near Stafford, 26th March 1659, and educated at Shenstone and Lichfield, till in 1674 he went up to Sidney Sussex College, Cambridge. In 1681, having taken his M.A., he was ordained, and next year became an assistant-master at Birmingham; but in 1688 he inherited from a cousin a very ample estate. Thereupon he married a wife, who bore him eleven children, and retired to a house in Charterhouse Square, London, from which he was never absent one whole night in upwards of thirty years till his death on 29th October 1724. Not long before he had burned several treatises, as 'short of that perfection to which he desired and intended to bring them;' and the one forgotten work by which he is remembered was first printed in 1722 for private circulation, though it soon reached an issue of over 10,000 copies. It is a development of Samuel Clarke's system, its methods exclusively rational, its conclusions optimistic; all sin, by its showing, is a denial of what is, and heaven is a necessary counterpoise for earthly misery.

See the Life prefixed to the 6th edition of the *Religion of Nature* (1738), and chaps. iii. and ix. of Leslie Stephen's *History of English Thought in the Eighteenth Century* (2d ed. 1881).

Wollaston, WILLIAM HYDE, 'one of the ablest and most renowned of English chemists and natural philosophers,' was born at East Dereham, Norfolk, 6th August 1766. He was the second son of the seventeen children of the Rev. Francis Wollaston (1731–1815), who was the grandson of the preceding, rector of Chiselhurst, and an ardent astronomer. He went up to Caius College, Cambridge; took his M.B. in 1787, his M.D. in 1793; and gained a fellowship. Starting practice as a physician in Bury St Edmunds in 1789, he soon

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removed to London; but being beaten in a competition for the post of physician to St George's Hospital in 1800, he vowed 'never more to write a prescription, were it for his own father,' but to devote himself wholly to scientific research. This resolve (which by some is ascribed to an accession of fortune) proved ultimately most beneficial, leading him rapidly to fame and wealth; for, unlike many eminent investigators of nature's laws and phenomena, Wollaston combined 'the genius of the philosopher with the skill of the artist,' and succeeded in making industrial applications of several of his important discoveries. His researches were prosecuted over a wide field, but were pre-eminently fruitful in the sciences of chemistry and optics. To the facts of the former science he added the discovery of new compounds connected with the production of gouty and urinary concretions, such as phosphate of lime, ammonio-magnesian phosphate (a mixture of these two forming the 'fusible' calculus), oxalate of lime, and cystic oxide; also the discovery in the ore of platinum of two new metals, palladium (1804) and rhodium (1805). By his ingenious method of rendering platinum malleable he made £30,000; and some other practical discoveries were also highly lucrative. His contributions to optics were the reflecting Goniometer (q.v.), the Camera Lucida (q.v.), the discovery of the dark lines in the solar Spectrum (q.v.), and of the invisible rays beyond the violet, and an immensity of valuable observations on single and double refraction. He did much to establish the theory of definite proportions, and was the first to demonstrate the identity of galvanism and common electricity, to account for the difference in the phenomena of each, &c. He was elected a fellow of the Royal Society (1793), its second secretary (1806), and a fellow of the Astronomical Society (1828). On 22d December of that last year, in which too he was awarded a royal medal, he died in London of a tumour on the brain, having just before worked out a sum to show that though speechless he was still conscious. He was a reserved and austere student, of whom yet we get pleasant glimpses in Lockhart's *Scott* and in Miss Edgeworth's *Letters*, and who on occasion was capable of splendid generosity.

See his thirty-nine memoirs in the *Philosophical Transactions* for 1809–29, and a sketch of his life in George Wilson's *Religio Chemici* (1862).

Wollongong, a seaport of New South Wales, 49 miles S. of Sydney by rail. It is a great centre for dairy-farming, and exports coal. Pop. 5000.

Wollstonecraft, MARY. See GODWIN.

Wolseley (VISCOUNT), GENERAL SIR GARNET JOSEPH, was born at Golden Bridge House, County Dublin, June 4, 1833. The Wolseleys are an old Staffordshire family, the manor of Wolseley having been in their possession before the Conquest. Educated by private tutors, and at a day-school near Dublin, he early showed a predilection for a military life, and his name was put down for a commission at fourteen. He entered the army in 1852, and since then has been constantly engaged in the service of his country, has proved himself a genuine soldier, and has delighted in dash and danger. He served in the Burmese war of 1852–53, and was dangerously wounded in the left thigh; he was severely wounded in the Crimea, where he served in the 90th Light Infantry; he lost the use of one eye, and had some marvellous escapes, and received the cross of the Legion of Honour for his bravery there. He was in India during the mutiny, and at its close received the brevet of lieut.-colonel though only twenty-six, and in the Chinese war of 1860. Next year he went to Canada, and in 1870 successfully put down the Red River rebellion under Louis Riel without losing a man. On the outbreak of the Ashantee war Wolseley, now K.C.M.G., was appointed to the command, and on his return received the thanks of parliament and a grant of £25,000 for the 'courage, energy, and perseverance' he had displayed in the conduct of the expedition; he was also presented with the freedom of the City of London and a sword. In 1875, become a major-general, he was despatched to Natal to superintend the affairs of the colony; in 1876 was nominated a member of the Indian Council. In 1878 he was made high commissioner in Cyprus, and in 1879 held supreme civil and military command in Natal, the Transvaal, and adjacent disturbed territories. He was commander-in-chief of the expedition to Egypt in 1882, received the thanks of parliament, was gazetted Baron Wolseley of Cairo and of Wolseley in Stafford, and had a large money grant conferred on him. In the same year he was promoted to the rank of general, and he was raised to the dignity of viscount after the Soudan campaigns in 1884–85. In 1890 he was appointed commander-in-chief of the forces in Ireland. Wolseley is the author of *Narrative of the War with China in 1860* (1862); the *Soldier's Pocket Book;* an essay on *Field Manœuvres* in the Wellington Prize Essays (1872); a novel (*Marley Castle*, 1877); and of several essays. See Low's *Memoir of Wolseley* (1878; revised ed. 1886).

Wolsey, THOMAS, cardinal, was born at Ipswich in 1471. His father, Robert Wolsey, seems to have been a grazier and wool-merchant of good substance—the story that he was a butcher having its origin only in contemporary gossip. In his eleventh year Thomas was sent to Magdalen College, Oxford, where at the age (early even for that time) of fifteen he took the diploma of Bachelor of Arts. In view of his subsequent career it is noted as a curious circumstance that his favourite study was the *Summa Theologiæ* of Thomas Aquinas, with which he became so conversant that he was known among his friends as *Thomisticus*. As a fellow of Magdalen, and master of the school attached to that college, he remained at the university till 1500, when the Marquis of Dorset gave him the living of Limington in Somerset. In 1501 he became chaplain to Henry Dean, Archbishop of Canterbury, and in 1506 a royal chaplain, acting at court as secretary to Fox, Bishop of Winchester. In 1508 he was sent on an embassy to Scotland, and in the autumn of the same year to the Low Countries to further a project of marriage between Henry VII. and Margaret, daughter of the Emperor Maximilian. As a reward for his general usefulness, Henry bestowed on him the deanery of Lincoln, the beginning of his immense fortunes.

But it is with the accession of Henry VIII. that the story of Wolsey's greatness begins. Appointed king's almoner and member of the king's council (1511), he speedily made himself an indispensable servant of the young king. In the war with France of 1513 he showed such energy and ability that Henry bestowed on him the bishopric of Tournai (an appointment never confirmed by the pope), and in the following year the sees of Lincoln and York. In 1514 Wolsey still further advanced his interests by contriving an understanding between England and France, which was the beginning of the continental policy he pursued till his fall in 1529. Though unpopular with the English people, this alliance first taught the continental powers that England was a factor to be reckoned with in all their future combinations. Wolsey was now one of the leading personages in Europe, and honours fell thick upon him from every side. He held *in commendam* the sees, successively, of Bath and Wells (1518), Durham (1523), and Winchester (1529); as also the abbey of St Albans. The year 1515 saw him Lord Chancellor of England,

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So great was Wolsey's predominance even at this point of his career that a Venetian ambassador said of him, 'He is seven times more powerful than the pope.' Twice, indeed, in his career he was actually within sight of the popedom itself. On the death of Leo X. in 1521 Wolsey's claim to the succession was strongly supported by Henry, and he had the promise of the emperor's good offices in his favour. But, whether Charles was sincere or not in his promise, when the choice came to be made he set aside Wolsey in favour of a candidate more likely to be at his bidding—Adrian of Utrecht, formerly his own tutor, and now acting as his regent in Spain. At Adrian's death, two years later, there was again a prospect of Wolsey's reaching the goal of his ambition; but Charles on this occasion also played him false, and another opportunity never occurred.

In the career of Wolsey, as in the development of modern Europe, a new chapter opens with the accession of Charles of Spain to the Empire in 1519. For the next quarter of a century the political history of Europe is mainly the history of the rivalry of Charles V. and Francis I. of France for the leading place among the western nations. To hold the balance between these two potentates, so that each should in turn be forced to make common cause with England, such was the foreign policy of Wolsey during the ten years he directed the affairs of his country. The skill and force with which he carried out his purposes is all the more striking that in Henry VIII. he had a master whose violent and jealous spirit would have thwarted a less able minister at every step. But with consummate art, while leading Henry to believe that he was the humble instrument of his wishes, Wolsey in reality controlled the destinies of the country. The policy of England during these years has been sketched in the account of Henry VIII. Here, therefore, it is enough to say that this policy was essentially the work of Wolsey, and that its result for England was the recovery of her place among the nations, which had been lost since the Wars of the Roses.

Wolsey's home policy was conducted on the simplest principles. In his conception it was the best interest of the country that the sovereign's will should be the one motive-power in the state, and parliaments existed simply for supplying the means for the execution of the royal commands. In accordance with these principles he made such frequent and large demands on the purse of the country that all ranks of the people detested him as the author of the ills from which they suffered during Henry's rule. Notable among Wolsey's domestic acts is his dissolution in 1524–29 of above thirty monasteries with fewer than seven inmates. This was done with the full consent of Rome; but, as it proved, Wolsey by this step led the way which Henry was afterwards to follow with such disastrous results to the ancient church in England. Wolsey's zeal for learning, as nobly shown in his foundation of a college in his native town of Ipswich, and of Cardinal College at Oxford, has always been noted as one of the redeeming traits of his character; and it is proof of the sincerity of his zeal that, in the wreck of his fortunes, one of his main concerns was that his college at Oxford should not suffer by his own ruin. The college at Ipswich, however, did not take definite shape, and Cardinal College, afterwards named Christ's College in despite to the memory of Wolsey, but inadequately fulfilled the aims of its founder.

It is part of the greatness of Wolsey's fortunes that his fate is linked with an event which is in itself a turning-point in the history of Christendom. Wolsey's failure to secure the divorce of Henry from Catherine of Aragon, his wife, was a question that took precedence of all others, and for which Wolsey had to find a satisfactory solution if he was to retain his position as the first subject in England. He had no choice but to use his best efforts to persuade Clement VII. to pronounce Henry's marriage illegal. In 1529, along with Campeggio, the legate specially sent by the pope, Wolsey sat in judgment on the case, with a result that left Henry as far as ever from the attainment of his end. This was no fault of Wolsey's, who was powerless against the diplomacy of Rome; but Henry was now in a mood that needed a victim, and the cardinal's enemies, reinforced by Anne Boleyn, had been long waiting their opportunity. Indicted for a breach of *præmunire* in procuring bulls from Rome, he was deprived of the Great Seal, and ordered to depart from his palace of York Place, and to take up his residence at Esher, near Hampton Court. Found guilty by parliament of the charges brought against him, he nevertheless obtained his pardon, and was allowed to retain the see of York. At Cawood, in Yorkshire, during the few months that were left to him, he won the hearts of the people by his charity and kindly demeanour. But his enemies could not be satisfied till his ruin was complete. On a charge of high-treason, to which he had imprudently given colour by his own intrigues, he was arrested by the Earl of Northumberland. This last stroke showed Wolsey that thenceforward he had nothing to hope, and seems to have completely broken his proud spirit. On the way to London to meet his trial he died at Leicester Abbey (November 29, 1530), with the well-known words on his lips, 'Had I but served God as diligently as I have served the king, He would not have given me over in my gray hairs.' 'No statesman of such eminence,' says Dr Brewer of Wolsey, 'ever died less lamented;' and he has remained one of the unpopular characters of English history. Except during his last days there was nothing in his character or career that was fitted to win the heart or touch the imagination of the people. They could not understand what he did for England abroad; and at home they saw the result of his policy only in the grinding taxation for which they naturally held him responsible rather than the youthful and pleasure-loving king. His arrogance and ostentation gave the greater offence in one who had come from the ranks of the people, and the tenor of whose life was so little in accordance with the profession of which he was the chief representative in the country. Disliked by the commons, he was detested by the nobility, whom his greatness overshadowed, and whom he did not think it worth his trouble to conciliate. It is only since the publication of the State Papers of the period that Wolsey has received his due as a statesman of the first rank, whose ambition was coincident with the interest of his country as he conceived it. While his public aims, however, are thus seen to have been nobler than his contemporaries supposed, in his personal character, in his embodiment of a type of churchman most alien to the religion which he represented, Wolsey still remains a figure associated with no principle of beneficence, and essentially repellent in all the salient features of his mind and heart.

See CROMWELL (THOMAS); Lives of Wolsey by George Cavendish (q.v.), Wolsey's gentleman-usher, from which the splendid figure in Shakespeare's *Henry VIII.* is closely drawn, Fiddes (1724), Grove (1742), Galt the novelist (1812), Martin (1862), Bishop Creighton ('English Statesmen' series); Lord Acton, 'Wolsey and the Divorce,' in the *Quarterly Review* for January 1877; Brewer, *Reign of Henry VIII.*; and Gasquet, *Henry VIII. and the English Monasteries* (1888–89).

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Wolverhampton, a municipal, parliamentary, and county borough, the 'metropolis of the Black Country,' stands on a gentle eminence amid a network of railways and canals, 13 miles NW. of Birmingham, 15 S. of Stafford, and 126 NW. of London. It was first called 'Hamton,' and then 'Wulfrunishamton,' after Wulfruna, King Edgar's sister, had founded in 996 St Peter's Church, which continued collegiate till 1846. Rebuilt during the 13th, 14th, and 15th centuries, and enlarged and elaborately restored in 1859–65 at a cost of £10,000, that church is a fine cruciform Gothic edifice, with a rude stone cross in the churchyard, a carved stone pulpit of 1480, and monuments to Admiral Sir Richard Leveson (d. 1607) and Colonel Lane (d. 1667), who assisted Charles II. in his escape from Worcester. Otherwise the public buildings are all modern—the town-hall (1868), in the Italian style, corn exchange (1853), market-hall (1853), agricultural hall (1863), hospital (1849), post-office (1873), art gallery (1885), drill-hall (1886), &c. A bronze equestrian statue of the Prince Consort was inaugurated by Queen Victoria in 1866; and there is also a statue (1879) of the Right Hon. C. P. Villiers (q.v.) of Corn-law fame, first returned as M.P. for Wolverhampton in 1835, and re-elected in 1892. The public park (1881) was laid out at a cost of £16,000. The free grammar-school, which was founded in 1512 by Sir Stephen Jenyns, Lord Mayor of London, and at which Abernethy and Sir W. Congreve were educated, occupies handsome new buildings of 1876; and there are also a blue-coat school (1710) and an orphanage (1850). Sir Stephen was a native; so too was the great Mr Jonathan Wild. Bishop Pococke described Wolverhampton in 1757 as 'a great manufacturing town in all sorts of toys, and particularly of locks in the greatest perfection;' and locks —some two million yearly—are still its specialty, the Messrs Chubb's works being here. The other manufactures include tinplate, japanned goods, enamelled hollow wares, edge-tools, gas and water tubes, electro-plate, papier-maché, chemicals, &c. The town stands on the western edge of the great coal and iron mining district of South Staffordshire, so that the vicinity on the south and east is all covered with collieries, ironstone mines, blast-furnaces, forges, iron-foundries, and rolling-mills, whilst on the north and west there is pleasant green country—Boscobel (q.v.) is only 8 miles distant. Wolverhampton was enfranchised in 1832, returning two members to parliament (three since 1885), and it was made a municipal borough in 1848, a county borough in 1888. The Wednesday market is held under a charter of 1258. Pop. of parliamentary borough (1851) 119,748; (1881) 164,334; (1891) 174,325, of whom 82,620 were within the municipal and county borough. See works by G. Oliver (1836), F. Hall (1865), Steen (1871), and J. Fullwood (1880).

Wolverine. See GLUTTON.

Woman's Rights. See WOMEN'S RIGHTS.

Womb, or UTERUS, a flattened, pear-shaped organ, lying in the line of the axis of the outlet of the Pelvis (q.v.), with its base directed upwards and forwards, and its narrower neck or *cervix* directed downwards and slightly backwards. In the unimpregnated condition it is about 3 inches in length, 2 in breadth, and 1 in thickness, and weighs about an ounce and a half. On laying it open its cavity is found to be very narrow, and to contain only a little mucus. Its walls are nearly half an inch thick, and are mainly composed of muscle-cells and fibres running irregularly in all directions except round the *os*, where they make a partial sphincter. This muscular layer, which constitutes the bulk of the organ, is covered externally with a serous coat, derived from the peritoneum, and is lined internally by a mucous membrane continuous with that of the canal called the *vagina*, by which the interior of the womb communicates with the outer surface of the body. This mucous membrane abounds in small mucous follicles, and is provided with ciliated Epithelium (q.v.). The lower end of the cervix projects slightly into the vagina, communicating with it through the *os uteri externum*, which is nearly round in the virgin, and transverse after parturition. This orifice leads into a narrow canal which terminates at the upper end of the cervix in a smaller opening, the *os internum*, beyond which is the shallow triangular cavity of the womb, of which it forms the lower angle, while the two upper angles, which are funnel-shaped, constitute the beginning of the Fallopian Tubes (see under OVARIES), whose apertures are so small as only to admit the passage of a fine bristle. The blood-vessels and nerves enlarge in a very remarkable way during pregnancy, so as to adapt themselves to the increased wants of the organ, which, at the ninth month of utero-gestation, weighs from 1½ to 3 lb. The term *appendages to the uterus* is given to the Fallopian Tubes and Ovaries (q.v.), which are enclosed by the lateral folds of the peritoneum called the broad ligaments. The womb is suspended in the pelvic cavity in such a way as, by its mobility, to escape rude shocks from without or disturbance from the varying conditions of the surrounding viscera, while at the same time it is able to increase vastly in bulk with comparatively little discomfort when pregnancy occurs. This is effected by several duplicatures of peritoneum, containing variable quantities of fibrous and muscular tissue, and known from their form or connection as the *broad*, the *round*, the *utero-sacral*, and the *utero-vesical* ligaments.

The uterus is an organ peculiar to the Mammalia, and in comparatively few of them (excepting the Apes and Cheiroptera) is it of the simple oval or triangular form which we have described. It is *two-horned* in the Ruminantia, Pachydermata, Solipedia, and Cetacea; and it is said to be *divided* where, as in most of the Carnivora and Edentata, and some Rodentia, it has only a very short body, which speedily divides both externally and internally, and is continuous with the oviducts or Fallopian tubes. The uterus is actually *double* in some of the Edentata, and in most of the Rodentia, including the mouse and hare; in which each Fallopian tube passes into an intestiniform uterus, which has two completely distinct openings lying near to each other within the vagina. In the Marsupiata and Monotremata the modifications of this organ are still more singular.

The chief offices or functions of the womb may be divided into those which relate to (1) Menstruation, (2) Insemination, (3) Gestation, and (4) Parturition.—For further details, see the standard works on anatomy and physiology.

DISEASES OF THE WOMB.—In consequence of its mobility, but particularly of the periodical changes it undergoes during the processes of menstruation and childbearing, the womb is an organ extremely liable to disease. It is of course quite impossible in such a work as the present to do more than indicate generally some of the more important of the morbid conditions met with and their symptoms; the more, as even a trained observer can seldom decide from the progress and symptoms of a case without a thorough examination what the nature of the disease really is.

Malformations occur as a result of imperfect development; the womb may be small or rudimentary, or it may be double throughout or in its upper part, as is normally the case in some of the lower animals.

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mon in consequence of the mobility of the organ. Their exact causation is not always perfectly understood; but they often lead to much pain and discomfort, to inflammation of the organ, to disturbance of menstruation, and to sterility. In many cases they may be remedied by mechanical means.

Prolapse, or displacement downwards of the womb, generally occurs in consequence of injury during childbirth. The cervix, or even the whole womb, may project from the orifice of the vagina, causing great distress and discomfort. Mechanical support, with or without previous operation, will usually give relief.

Inflammation, affecting the cervix only or the whole womb, often follows childbirth, or may result from displacement of the womb, cold, and other causes. But the most fruitful sources of it are probably neglected miscarriages; for it is not sufficiently recognised that almost as much care is required to ensure complete restoration to health after a miscarriage as after a confinement. Various forms and degrees of inflammation vary much in their results, but generally speaking they lead to abnormal discharge from the vagina (popularly called 'whites'), irregular menstruation, pain in the back and pelvis, and often to great constitutional weakness and nervous disturbance. The most suitable treatment varies much in different cases, but is often tedious and troublesome.

The womb is a very frequent seat of *tumours*. In many cases the chief symptom is excessive menstruation; but in some forms of fibroid tumour there may be such an absence of symptoms that the growth is discovered only by accident. Pedunculated tumours, or Polypi (q.v.), within the uterus can generally be removed with little trouble or risk. '*Fibroid*' tumours, consisting of fibrous tissue with a variable proportion of unstriped muscular fibre, resembling that normally present in the uterus, are by far the most frequent tumours in this situation. They are most common in middle life; after the 'change of life' they usually cease to grow, or to give rise to any symptoms except those due to their mere mechanical presence. They may be of enormous size; tumours of 70 or 80 lb. have been met with. Considering their frequency, it is surprising how seldom they lead to the death of the patient; but they often cause excessive hæmorrhage and great debility. When situated near the internal surface of the womb, they are sometimes expelled spontaneously. Removal by ordinary surgical methods has often been practised in severe cases, and with steadily improving results. In 1884 Dr Apostoli of Paris brought into notice a method he has introduced of passing strong electric currents through the womb, for which he claims that it produces diminution of hæmorrhage and practical cure in many cases without the risks of an operation. Medical opinion is still much divided as to the results and value of this procedure.

Malignant tumours of the womb are also very common; of all the organs of the body indeed this is by far the most frequent seat of cancer. In the vast majority of cases the disease begins in the cervix; and at an early stage it may sometimes be removed with success. But if not completely eradicated it speedily spreads to neighbouring parts, and a fatal result is inevitable. It is rare before thirty years of age; most common between forty and sixty. The first symptom is usually hæmorrhage; pain is rarely present in the earlier stages, and may be absent throughout. Sarcoma is sometimes met with, but is much less common than cancer in this situation.

See also GESTATION, MENSTRUATION, OBSTETRICS, OVARIOTOMY, REPRODUCTION, and works cited at STERILITY.

supial mammals, resembling in many chara
the rodents. There are no canines, and the
cisors are large and with enamel only on the f
surface; there are only two in each jaw, grow
like all the teeth, from persistent pulps.
molars are ten in each jaw. The limbs are s
and short, with five toes, all provided with
curved claws, except the very short first toe
the hind feet, which are nailless. The tail is r
mentary. In their general form and actions
wombats resemble small bears, having a sin
shuffling plantigrade walk; but they are
shorter in the legs and broader in the back t
those animals. They live on the ground an
burrows or holes among rocks, feeding on ro
grass, and other vegetable substances. They s
in the day, seeking their food at night, and
usually gentle in their habits, though their l
chisel-like incisors enable them to bite strongl
provoked. There is one existing genus, contain
three species. The wombats of Tasmania and
islands of Bass Strait (*P. ursinus*) and the la
species (*P. mitchelli*) of the southern mainlanc
Australia have rough and coarse fur, a smo
muzzle, and short rounded ears. The larger spe

Wombat (*Phascolomys latifrons*).

is very variable in colour, ranging from pale yello
ish brown to black. *P. ursinus* is brownish gra
like the third species, the Hairy-nosed Womt
(*P. latifrons*), which differs from the other two
having smooth silky fur, a hairy muzzle, and lar
pointed ears. It inhabits Southern Australia. T
largest living wombat (*P. mitchelli*) is about 3 fe
long, but remains of a large extinct genus (Phs
colonus), which must have been nearly as large
a tapir, have been found in Queensland. S
Gould's *Mammals of Australia*.

Women's Rights is a name given original
by its promoters, but afterwards more frequent
used by its opponents and detrac- Copyright 1892 in U
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Company.
tors, to the movement, called
by Mr George Meredith 'the most
indigestible fact of our century,' of women toward
personal and proprietary independence. The socia
legal, and economic changes which these word
imply have in no country at present been con
pletely worked out, but the process has begun an
is in a different stage towards its completion i
every country of progressive civilisation. Th
largest strides towards the complete independenc
of women have been made in the United Kingdon
the Australian colonies, and the United States c
America. It would not be possible in the spac
allotted to this article to trace the movement wit
any degree of completeness, even in these thre
countries, still less in the various countries c
Europe which are largely affected by it. Atter
tion will therefore here first be drawn to th

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general causes which have given rise to the movement and account for the universality of its operation, and then to a brief outline of its recent development in Great Britain. It is to be particularly observed that the whole of modern society has been influenced by this movement; it is a living social force from Scandinavia to India, from San Francisco eastwards to the Ural Mountains, producing its reflex in all modern literature, laws, and institutions.

Sir Henry Maine points out in *Ancient Law*, and also in *The Early History of Institutions*, that this movement is really part of a far larger movement—i.e. the gradual emancipation of the individuals forming the family group from the absolute control of the head of the family. In patriarchal times every individual in the family group was completely subject to the *patria potestas;* sons, servants, children, wives could hold neither property, liberty, nor life except at the good-will and pleasure of the head of the family. The subordinate members of the family had no rights, no responsibilities, and no duty beside obedience. Little by little the absolute rule of the head of the family over the various members of the family group was encroached upon. The first step was a recognition of different kinds and degrees of power; at first the patriarchal power was identical in character over the whole of the persons and possessions of the family. The power over flocks and herds was not more absolute than that over sons, slaves, or wives; but gradually a difference was felt to exist, and different names were given to the different kinds of power exercised by the head of the family over the different members of it. Over material possessions and slaves it was called *dominium;* over children it was *potestas;* over free persons serving the family it was *mancipium;* over the wife it was and is *manus*. In the gradual development of modern society all the members of the family group, except the last, have completely emancipated themselves from the absolute control of the head of the family. The emancipation of women has proceeded more slowly than that of the other members of the family group; but the germ of it has been present from the dawn of history, and has been more or less widely recognised and developed in all progressive societies. Sir Henry Maine attributes in a very large degree the difference between the stagnant civilisation of the Hindu races and progressive civilisation of the Romans and the races influenced by Roman institutions to the fact that the latter have steadily and voluntarily relaxed the subjection of women, while the former have recoiled from these changes, and have used the combined authority of religion and law still further to complete the seclusion and degradation of the female sex.

The movement towards the emancipation of women is one from status to contract, from communism to individualism, from a condition in which the individual creates for herself few or no rights, few or no duties, to one in which she develops personal responsibility and independence. This view of the subject may suggest to the observer reasons which account for the universality of the women's rights movement wherever progressive societies exist, the different stages of its development in different countries being traceable to local causes. 'The movement of progressive societies has been uniform in one respect. Through all its course it has been distinguished by the gradual dissolution of family dependency, and the growth of individual obligation in its place. The individual is steadily substituted for the family as the unit of which civil laws take account' (*Ancient Law*, p. 168). The most casual observer is aware that very much has been done in this direction so far as women are concerned in Great Britain during the 19th century. The husband no longer acquires by the mere fact of marriage control over the property of his wife (Married Women's Property Act, 1882); certain limited rights of guardianship over her children have been secured to her by law (Custody of Infants Act, 1886). Formerly all the children of a marriage were wholly under the control of their father, the mother possessing, even after the death of her husband, no authority except as his deputy. By the abolition of imprisonment (by an act passed in 1884) as the punishment for refusing an order of court for the restitution of conjugal rights, a wife's right to have control of her own person has been established. Minor alterations of the law, such as that which has recently improved the legal position of the wife in case of the intestacy of her husband, in the event of desertion by her husband, &c., are of tolerably frequent occurrence. The movement is perhaps not very rapid, but it is all in one direction; it is like a glacial drift, you cannot see it move, but when you look again, after a sufficient interval, you see that it has moved, and it always moves in the direction of increasing the personal and proprietary independence of women.

One main reason why this movement has been so much more marked during the 19th century than in any preceding time may probably be found in the economic changes accompanying the application of steam and labour-saving appliances to manufactures. The immense development of manufacturing as contrasted with domestic industries has laid the foundation of economic independence for the great mass of working women. When a woman works as a member of a family group, the result of her work belongs not to herself, but to her family—that is to say, generally speaking, to her father or her husband. When a woman works in a factory her wages are her own property; she has passed from family dependency to self-dependency. The difference is not so much that working women work more than they did: the great mass of people must always work in order to live; but the result of their labour in the shape of wages forms a fund over which the worker now has the sole control, whereas in earlier times all she produced belonged to another, who in return certainly allotted her board and lodging, but believed himself to be doing so out of his own property, and not out of hers. Even now the domestic work of women is not often esteemed at its proper economic value. In an average working-class family the man is usually called the 'bread-winner.' He would say in perfect good faith that he 'kept his wife and family;' although the working-class mother, if she is an industrious woman with an average-sized family, leads a life of almost incessant toil for their benefit. The woman who cleans, sews, cooks, and washes for a man and six children 'keeps' the family quite as essentially as the man who turns a lathe or ploughs the land, and thereby brings in a weekly sum of money to the family purse. The value in money of women's work in a factory may probably before long cause a more general recognition of the value in money of women's domestic work. Its value in a sense that is beyond all money, if she does her duty to her children, fortunately stands in no need of emphasis.

The view that the recent rapid development of the Women's Rights movement rests on an economic basis receives confirmation from the fact that the greatest progress towards the independence of women has been made in those countries (Britain and its colonies, and the United States) that have been foremost in adopting modern economic changes in the application of steam and labour-saving machinery to industry. Countries that are

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most backward industrially are also most backward in raising the condition of women. Where the industrial development of a country offers the opportunity of economic independence to women social independence with all its various ramifications makes rapid progress; education, entrance into the professions, wider opportunities of work, of knowledge, of enjoyment, a share in public life and political liberty are demanded, and in Britain have been or are being secured.

The first fully conscious demand on the part of women in England for education, for employment, for political liberty, is to be found in Mary Wollstonecraft's *Vindication of the Rights of Women*, published in 1792. Mr Lilly in his book *On Shibboleths* (1891) devotes a chapter to an attack on Women's Rights, in which he asserts that after the publication of Mary Wollstonecraft's book, 'which made a certain stir,' but was 'soon forgotten,' the question of women's rights slumbered for seventy years, till it was revived by John Stuart Mill. The importance of Mr Mill's services to the women's movement cannot be exaggerated; but it is incorrect to assert that it had slumbered till he awoke it; during the 19th century the question has never slumbered; the foremost minds of the time have dealt with it and led it. From the somewhat erratic but brilliant and meteor-like championship of Shelley, the great literature of the century has never ceased to concern itself with the women's rights question. *Aurora Leigh* is an essay on women's rights which touched the relation of men and women at its very foundation with a master-hand and fearless decision. That it was recognised in this character by some at least of the opponents of women's rights is evident from Edward FitzGerald's outburst on the occasion of Mrs Browning's death: 'No more Aurora Leighs, thank God! A woman of real genius, I know; but what is the upshot of it all? She and her sex had better mind the kitchen.' Tennyson could not keep his pen from women's problems, and dealt with them to the disgust and astonishment of his friend FitzGerald in *The Princess*. The works of the Brontë sisters, especially Charlotte Brontë's *Shirley*, are full of the working of the ferment of women's rights. The same may be said of nearly all George Eliot's writings, of innumerable passages in Thackeray's, and continues to be true of the literature of our own times down to the *Story of an African Farm*, the works of Charles Reade, Mr George Meredith, Mr Thomas Hardy, and above all of the writings of Tolstoi, Ibsen, and Björnstjerne Björnson.

But the new force of the movement towards women's rights has made itself felt not only in what has been written by women and about women, but in what women have done, in the practical work they have accomplished. The women writers we have named and many others, including some who vehemently denounce the movement, are its products. We could not have had a Mrs Browning, nor a Mrs Somerville, a Harriet Martineau, nor the Brontës, Mrs Fry, Miss Octavia Hill, Miss Nightingale, Mary Carpenter, nor even a Mrs Lynn Linton and Mrs Humphry Ward, if the women of the 19th century had still been condemned to

> A sort of cage-bird life, born in a cage
> Accounting that to leap from perch to perch
> Was act and joy enough for any bird.

The opening of ordinary industrial employments which was brought about by large economic forces affecting the whole of society must be regarded not as a product of the women's rights movement, but as the principal material cause of its recent rapid development. Supplied with that motive power, the momentum acquired has been sufficient for many conquests. Many other employments and professions, notably that of medicine, have been opened to women; the lady journalist has made a position; other occupations in the hands of women from time immemorial (e.g. nursing and teaching) have been re-created and a wholly new spirit breathed into them. Education for girls and women not inferior in quality to that provided for boys and men has been successfully struggled for. Queen's College, opened in 1848 through the initiative of the Rev. F. D. Maurice and Dr (afterwards Archbishop) Trench, was the first attempt to provide university education for women in England. Bedford College, founded by Mrs Reid, was the next to follow. The national importance of girls' education was recognised by including girls' schools in the purview of the Schools Enquiry Commission appointed in 1864. The doors of the older universities were knocked at a few years later when Miss Emily Davies organised a petition to the university of Cambridge to open its local examinations to girls. This prayer was granted in 1865, and was the first recognition in England that the universities have duties in regard to women's education. The movement thus initiated resulted, mainly under the able guidance of Miss Davies, in the establishment of Girton College. About the same time the North of England Ladies' Council of Education—of which Miss A. J. Clough (1820–92) and Mrs Josephine Butler were leading members—began courses of lectures for women by university lecturers in a group of northern towns. Out of the demand that was thus found to exist for higher instruction for women sprang two important institutions: (1) the university extension movement, with its corollary in the University Colleges now existing in nearly all the most important centres of population throughout the kingdom, and (2) Girton College (q.v.) and Newnham College (q.v.), the one opened in 1869, the other in 1871. The experience gained as the result of opening university education to women was so encouraging that in 1881 the senate of the university passed a grace by an overwhelming majority (258 to 26) to open their honours examinations to women students of Newnham and Girton, without however conferring the degree upon them. Before the passing of this grace women students had only been examined as a favour, and by the good-will, which was seldom wanting, of the examiners. Since Cambridge led the way, Oxford has followed, though not upon identical lines. Permissive powers were in 1892 given to the courts of all the Scottish universities to admit women to a degree in any faculty, and to make provision for the instruction within the university of women in any subject; and in November 1892 about 100 women (more than half of them matriculated) were attending the public lectures in the faculty of arts at Edinburgh. London University opened all its degrees to women in 1878, and since that date all other newly-founded universities, the Royal in Ireland and the Victoria in England, have admitted women to a position of perfect equality so far as degrees are concerned. Meanwhile secondary education for girls had been undergoing a revolution not less searching than that which has converted the ignorant and gin-drinking Mrs Gamp of former years into the trim, deft-handed certificated nurse of to-day. What Florence Nightingale and her coadjutors did for nursing and nurses Mrs William Grey, Miss Shirreff, Miss Buss, Miss Beale, and others have done for the teachers and the taught in girls' schools. The result of improving the education of girls and women has been the overthrow of many cherished convictions, or rather prejudices formed without knowledge, on the limitations of the female intellect. Women have shown themselves capable of benefiting by the highest kind of instruction

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which a university can afford, and again and again in recent years the blue ribbon of the various triposes has been won by a girl student. The result has been a larger number of women engaged in scientific pursuits, in historical, archæological, and classical research. Of the direct value of their work in increasing the sum of human knowledge experts alone have a right to form an opinion; but of the social advantages to the women themselves and to the society of which they form part there can be no doubt:

> Get leave to work
> In this world—'tis the best you get at all:
> For God, in cursing, gives us better gifts
> Than men in benediction. . . .
> Get work, get work:
> Be sure 'tis better than what you work to get.

A further social benefit has accompanied the opening of various avenues of work to women; it has increased the opportunities of comradeship and multiplied the bonds of friendship between men and women. The number of points at which their lives touch and run in unison has been increased. There are links of sympathy between them in the study as well as in the kitchen. It is almost as impossible to conceive of a modern man saying of any woman of genius 'she and her sex had better mind the kitchen' as it is to conceive of any modern man thinking of women as Pope, Lord Chesterfield, and Milton wrote of them.

A few words must be given to the successful struggle on the part of women to obtain medical education and an equal status with men in the medical profession. Dr Elizabeth Blackwell (q.v.) was the first woman upon the English medical register. She was placed upon the register in 1859 in virtue of a foreign degree (New York). Later on foreign degrees ceased to give their owners a claim to be placed on the English medical register, and the second Englishwoman who desired to study and practise medicine had to enter by another door. Miss Elizabeth Garrett, now Mrs Garrett Anderson (q.v.), M.D., began her work of opening the medical profession to her own sex in 1860. After much effort and many repulses from various licensing bodies, she discovered that the Society of Apothecaries had no power under their charter to exclude her. She obtained their license and was placed on the register in 1865. This entrance for women into the profession was almost immediately afterwards closed. Three other women presented themselves in 1867 for the preliminary examination and passed successfully; the council of the Apothecaries Society was immediately called together, and a resolution was passed which had the effect of excluding women in future from the examinations of the society. Many years of unremitting effort followed: in Edinburgh an extraordinary degree of acrimony was manifested by the opponents of the women students. All means of getting upon the English register were closed, but women continued to get their medical education abroad, at Paris, Zurich, &c., and returned to practise in England. A women's dispensary and hospital were opened where all the regular staff were women. A medical school for women was opened in London, and later in Edinburgh and Glasgow. In 1876 an 'Enabling Bill' was passed under the leadership of Mr Russell Gurney, which empowered all the various licensing authorities in Great Britain and Ireland to open their examinations to women if they were so disposed. The first examining bodies to avail themselves of this power were the King's and Queen's College of Physicians, Ireland, and the Queen's University, Ireland. They were quickly followed (in 1878) by the London University, and no legal hindrance any longer obstructs the entrance of women into the profession. The change that has since that time taken place in the view of the majority of medical men with regard to women doctors is illustrated by the fact that in 1877 the British Medical Association at its annual meeting passed a resolution declaring in future all women to be ineligible as members, and in 1892 the same body, meeting at Nottingham, rescinded this resolution by the enormous majority of 600 to 4. In 1892 a movement was on foot to open the medical classes of the Cork Infirmary to women.

No account of women's rights would be complete which did not touch upon the great struggle against the worst of women's wrongs, the forcible subjection of women to the lowest animal instincts of men. In France and in other Latin countries women of a certain class are treated like cattle, and are absolutely at the disposal of the wretches who farm their destruction for their own pecuniary profit. White slavery is a term that but feebly indicates the horrors of the system. Mrs Browning throws light from the fire of her genius on this dark chapter of women's wrongs in the story of Marion Erle in *Aurora Leigh*.

> I was not, as you say, 'seduced,'
> But simply murdered.

There are men in every country who use their command of wealth, of physical strength, of mental subtilty to subdue a woman to their vicious instincts, and then despise her for being what they have made her; they execrate her for not having what they have robbed her of. The legal position of women of this class has never been so terrible in England as in France and other continental countries; but an attempt was made in 1866 and in 1868 by the passing of what were known as the Contagious Diseases Acts, to introduce part at least of the continental system into the English garrison towns. The acts were passed and were in operation for twenty years, but throughout these twenty years an unceasing and most active agitation was kept up for their repeal, led with persistent courage by Mrs Josephine Butler. The acts were repealed under the parliamentary leadership of the Right Hon. James Stansfeld in 1886; they have since that time been condemned by the medical profession (Hygienic Congress, 1891) as completely useless from the hygienic point of view; but this was not the motive power which brought about their repeal. This was supplied by the steadfast resistance of the women of England, led by Mrs. Butler, to the doctrine that vice was necessary, and being necessary the state was bound to provide, at the expense of the personal liberty of the women sacrificed to it, that it should be as little dangerous as possible. Directly growing out of this movement other reforms have been forced upon an unwilling legislature with the object of giving greater protection to women and girls from the vicious and mercenary instincts of depraved men and women. The age of consent has been raised from thirteen to sixteen; and many offences against women, not formerly recognised as such by law, have been made criminal. Much has been done in this field towards the reparation of the wrongs of centuries, but much still remains to do.

With regard to the claim of women to take part in public life, to share in political work and responsibility, many changes in the direction of conceding what the Women's Rights party demand have been made, but the battle still rages loud and long over the claim to the parliamentary franchise. The women of Great Britain now exercise the municipal, school board, board of guardians, and county council suffrages. In addition to this they sit on school boards and on boards of guardians, where their influence has been in the highest degree

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infirm in the workhouse infirmaries, and in the education and nurture of pauper children. If there are any children in the world that have a motherwant, it is the children in workhouses. This want the lady guardian, where she exists, has done much to supply. There is virtually no opposition whatever to the extension to women of powers of this kind. When Mr Ritchie in 1888 introduced his Local Government Bill for the creation of county councils he was asked if his bill enfranchised women. He answered, 'Certainly, sir,' and the announcement was received with cheers from all parts of the House; no amendment with the object of excluding women was moved. Considerable opposition is, however, still provoked by the proposal to confer the parliamentary franchise on duly qualified women. But in proportion to the effort that is made in the House of Commons against women's suffrage the parliamentary majority against it is remarkably small. In the session of 1892 a whip against a very moderate women's suffrage bill introduced by Sir Albert Rollit, Conservative member for Islington, was signed by twenty leading members of parliament representative of every section of the House, including Mr Chamberlain, Mr Labouchere, Sir William Harcourt, and Lord Randolph Churchill. The attack on women's suffrage was further supported by a pamphlet from the pen of Mr Gladstone. Notwithstanding this remarkable combination of hostile forces, the majority against the second reading (23) only very slightly exceeded the number of members who had signed the hostile whip, the numbers being, with tellers and pairs, 179 to 202. The reason of this small majority against women's suffrage is probably to be found in the activity of women in political work. The intense interest awakened on both sides on the subject of Home Rule for Ireland led to the formation in each political party of women's political associations. The Conservative party was first in the field of social change, the Primrose League being formed in 1883, some years before the other political party had encouraged any political organization among women. Women are now found to be extremely efficient as canvassers in looking up out-voters, and also in addressing political meetings. The difficulty of maintaining that women are fit to do political work, are in fact fit to advise voters how to vote, but are not fit to vote themselves, amounts in many minds to an impossibility. This is especially felt by members of parliament from the fact that the great majority of women who are able and willing to do political work are strongly in favour of the political emancipation of their own sex. Just before the division on women's suffrage in 1892, 168 branches of the Women's Liberal Federation petitioned their members in favour of the bill. In the immediate prospect of a general election these petitions carried more than ordinary weight. Women's suffrage is now in the peculiar position of receiving support mainly from two sources—the leaders of the Conservative party, and the rank and file of the Liberal party. The Marquis of Salisbury and the Right Hon. A. J. Balfour support it, and the National Congress of Conservative Associations meeting at Birmingham in November 1891 passed a resolution in its favour by an overwhelming majority. The leaders of the Liberal party, however, as a whole, give it no support; they are aware from former experience that the Liberal feeling in the country favours it; they will not therefore suffer the subject to be discussed at their party conferences in the provinces. The belief no doubt exists that an extension of the parliamentary suffrage to women householders would tend to accounts for the anomalous features of the political position of the question. It is based on Liberal principles, but would be advantageous to the Conservative party. This is, however, the mere accident of the moment, and the whole situation as regards the political prospects of the question may probably enter a new phase before many years have passed.

In the Isle of Man women have voted in the election of members of the House of Keys since 1880; and women's suffrage has for several years past been making rapid progress in New Zealand and in the Australian colonies. South Australia, Victoria, New South Wales, and New Zealand had by 1892 come very near passing women's suffrage bills. In South Australia in 1890 the majority on the third reading was only one short of the absolute majority of the whole House that the constitution requires for the passing of a constitutional amendment. In New Zealand in 1892 a women's suffrage bill passed all its stages in both Houses, but was finally abandoned because of differences between the two Houses on the mode of recording the votes of women. Experience is favourable to women's suffrage; the general feeling where it has been tried is overwhelmingly in its favour; it has produced none of the disasters that its opponents confidently predicted of it. This favourable experience cannot be without its weight; it is not, however, probable that the House of Commons will be very materially influenced by the experience of localities the circumstances of which are so widely different from those of the United Kingdom. If Englishwomen are to gain political emancipation, it will be by their own political work and by convincing the majority of their countrymen that they can be included in the rights and duties of political citizenship without risk and with advantage to the interests of the nation as a whole. Those only appreciate the whole significance of the present effort for the political emancipation of women who recognise in it a phase of that larger women's rights movement which is the subject of this article.

In the United States the movement began in connection with the anti-slavery agitation, the first convention being held in 1848; and from 1852 till the civil war annual meetings were held. The suffrage was granted to women in Wyoming in 1869. In some states they have the municipal suffrage; in about half of the states the right of women, married and unmarried, to direct representation in public school questions is recognised. In all the states the profession of medicine is open to women; in almost all the states where the question has been raised women are empowered to enter the legal profession. By special act of congress they may even be commissioned attorneys-at-law of the Supreme Court; and by the federal government they may, as citizens, be commissioned as 'post-mistresses, United States marshals, captains of steamboats, surgeons in the army, nurses and matrons in government hospitals, clerks in the several departments of government.' Many colleges and universities admit women to full medical and legal courses. The oldest universities and colleges do not admit women to a full course of instruction in all departments; but most of those founded since 1840 receive men and women on equal terms. The first women graduates were three, in 1841, from Oberlin. There are few colleges for women alone; the most famous of them are Vassar (q.v.) and Smith College at Northampton, Massachusetts. Bryn Mawr College, 10 miles from Philadelphia, follows the 'group system' of studies as organised in the Johns Hopkins University. It was found

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men, and was opened in 1885.

See Sir Henry Maine's *Ancient Law* and *Early History of Institutions*; Mary Wollstonecraft's *Vindication of the Rights of Women* (1792); John Stuart Mill's *Subjection of Women* (1861; new. ed. 1883); *The Woman Question in Europe*, edited by Theodore Stanton (New York, 1884); Hon. Horace Plunkett, 'The Working Women's Suffrage in Wyoming,' in the *Fortnightly Review* (1890). See further the articles on Hypatia, Joan of Arc, Maria Gaetana Agnesi, Mrs Somerville, Mrs Jameson, on the women authors named in the preceding article, and other eminent women separately discussed in this work; also the articles on HUSBAND AND WIFE, MARRIAGE, DIVORCE, WIDOW, FACTORY ACTS, &c.

Wonders, Seven. See SEVEN WONDERS.

Wood, or XYLEM of the botanists, has a wider significance than that in popular use. Nearly all plants, from ferns to flowering plants, have vascular ribs in their leaves. These ribs consist of tubes or vessels (sap-carriers) supported by strong skeleton-work of fibres; hence they are called fibro-vascular bundles. Usually throughout the length of the bundles there are two groups of elements in close connection; the upper is the wood whose cells carry sap from the roots by way of the stem to the leaves, and the lower is the bast whose cells convey the elaborated sap (see VEGETABLE PHYSIOLOGY) down to the stem and to all growing parts of the plant. The bundles pass from the root into the stem, where they form a network in which all the wood elements in Phanerogams (or flowering plants) are towards the heart of the stem and the bast elements to the outside. It is only in the stems of Phanerogams that wood in the sense of Timber is formed. Further, wood is formed only in those plants in which the bundles arrange themselves in a cylinder, as in the stems of Dicotyledons and Gymnosperms.

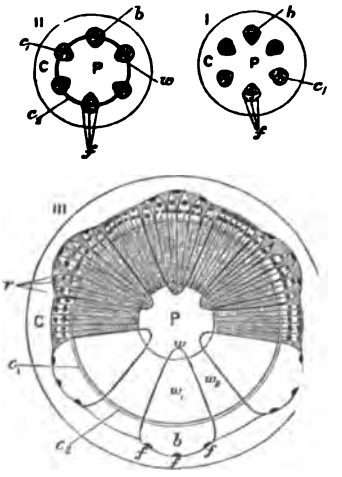

Fig. 1.—Diagram of ordinary growth in thickness, with the development of a compact woody mass. Figures I., II., III., the same transverse section of a stem at different stages in order of development. I., before the formation of the cambium between the bundles; II., at the time of its formation; III., after the cambium has been active for some time.

Everywhere, C, cortex; P, pith; *w*, wood of the vascular bundle; *b*, the three groups of fibres of bast; *c*, cambium of the original bundle: c_1, cambium formed between the bundles; c_2, cambium formed from the cambium of the bundle; w_2, wood formed from the cambium between the bundles; *r*, medullary rays. (After Sachs.)

dicotyledonous (obsole

often cracks along the medullary rays, which are made up of cells with thinner walls than the neighbouring wood cells and vessels; consequently the medullary rays are lines of least resistance. If a tree is deprived of its leaves by insects or other agencies during the summer, the formation of wood ceases; but if the tree recovers from the injury and forms new leaves, then new wood resembling spring wood is formed, and this is followed by the usual autumn wood. In such a case a double ring will thus be formed in one year; hence the necessity of accepting with caution the number of rings as the exact age of the tree. The effects of a cold season will be seen in the narrow ring of wood produced, while a warm season will cause the formation of a broad ring. The general breadth of the annual rings increases with the age of the tree up to a certain period, and then begins to decrease. It is seldom that the rings are of uniform breadth round the stem; they are usually broader on the side exposed to the greater light and air; while the lateral branches of most dicotyledons have thicker annual rings on their upper than on their under surfaces, and the branches of conifers have the greater thickness on the under surface. (For explanation of heart-wood—Duramen—and sap-wood—Alburnum—see TIMBER.) The hardness of wood is due to lignin, a substance of unknown composition related to Cellulose (q.v.); hence woody tissues are said to be lignified. See *The Oak* (Modern Science, 1892), and *Timber and some of its Diseases* (1889), by Marshall Ward.—For the preservation of wood from decay, see TIMBER, DRY-ROT; for wood-pulp in paper-making, see PAPER; see also PAVEMENT.

Wood, or À WOOD, ANTHONY, antiquary, was born at Oxford, 17th December (St Lazarus' Day) 1632. In 1647 he was entered at Merton College as a gentleman-commoner, and became a postmaster; in 1652 he took his bachelor's, in 1655 his master's degree. Being of independent means, he took to no profession, but practised the violin assiduously, and devoted himself to heraldry and antiquarian studies. Lighting on Dugdale's *Antiquities of Warwickshire*, he recognised the work of his life, and thereafter laboured with a more constant assiduity. The fruit of these labours was his *History and Antiquities of the University of Oxford*, his copy of which the delegates of the university press bought for £100, caused it to be translated into Latin, and published as *Historia et Antiquitates Universitatis Oxoniensis* (2 vols. folio, 1674). Wood was very ill satisfied with the translators' work, and made a new copy of his English MS., which was at length published by John Gutch, as I., *The History and Antiquities of the Colleges and Halls in the University of Oxford*, with an appendix containing *Fasti Oxonienses* and Index (2 vols. 4to, 1786–90); II., *The History and Antiquities of the University of Oxford* (2 vols. in 3, 1792–96). He continued to labour on his great work, *Athenæ Oxonienses:* an exact history of all the writers and bishops who have had their education in the university of Oxford from 1500 to 1690, together with the *Fasti* or Annals for the said time (2 vols. folio, 1691–92). In 1693 he was fined in the vice-chancellor's court and banished the university for some libellous remarks therein on the Earl of Clarendon, but was permitted to return after a recantation. He died 28th November 1695.

Other works were *The Ancient and Present State of the City of Oxford* (4to, 1773, which forms a pendant to the earlier of his two great works), and the ill-natured *Modius Salium, a Collection of Pieces of Humour* (1751). Wood himself prepared the materials for a third volume of his *Athenæ*, but did not see it printed. This was included in the second edition printed by Tonson (2 vols. folio, 1721). The third edition, with additions, is that by Philip Bliss (4 vols. 4to, 1813–20); a projected fourth by the same erudite scholar, to be issued by the short-lived Oxford Ecclesiastical History Society, saw only the first volume, containing the Autobiography (1848). This last was edited in 1892 by Mr Andrew Clark for the more promising Oxford Historical Society, which proposes to issue a complete edition of Wood's works.

Wood, SIR EVELYN, soldier, was born, the son of the Rev. Sir J. P. Wood, at the vicarage of Cressing in Essex, 9th February 1838, and entered the navy in 1852, serving in the Crimea with distinction in the Naval Brigade. He then became a cavalry officer, and as brigade-major was present at several engagements in the Indian Mutiny war, receiving the thanks of the Indian government and the Victoria Cross. As lieutenant-colonel of infantry he was with Wolseley during the Ashantee war. He was called to the bar in 1874, but left the Middle Temple to command a column through the Zulu war, leading the advance as brigadier-general at Ulundi. Created K.C.B. in 1879, he had a share in the Transvaal war (1880–81), and assisted as commissioner in settling affairs in that region. A G.C.M.G., he received the thanks of parliament for his services in Egypt in 1882, and in the same year became commander-in-chief of the Egyptian army. From 1886 onwards he held home appointments. He has received innumerable distinctions, including medals, the Medjidieh order, a knighthood of the Legion of Honour, the Khedive's star, &c. See the Life by Charles Williams (1892).

Wood, MRS HENRY (*née* Ellen Price), a popular novelist, born in Worcester, 17th January 1814, the eldest daughter of a prosperous glove-manufacturer. She was married early to Mr Henry Wood, a gentleman connected with the shipping-trade, and for many years lived in France, but settled after his death in London, and commenced writing for *The New Monthly Magazine* and *Bentley's Miscellany*. Her first novel was *Danesbury House* (1860), a prize tale of the Scottish Temperance League, followed by *East Lynne* (1861), which had an almost unexampled success, although in no sense a great story. Having found her public, Mrs Wood poured forth in succession upwards of thirty novels more, perhaps the best being *The Channings* (1862), *The Shadow of Ashlydyat* (1863), *Oswald Cray* (1864), *A Life Secret* (1867), *Dene Hollow* (1871), *Within the Maze* (1872), and *Pomeroy Abbey* (1878). In her novels she contrived to unite plot and melodrama without outraging morality, but her work never rises in quality above the commonplace, and there is ever present a thread of vulgarity. She revealed, however, some power in the analysis of character apart from plot in her anonymous *Johnny Ludlow* stories (1874, 1880). Mrs Wood in 1867 became the proprietor of the *Argosy*, a sixpenny monthly magazine, and her novels went on appearing in it long after her death, on 10th February 1887.

Wood, JOHN GEORGE, popular writer on natural history, was born in London in 1827, and studied at Merton College, Oxford. Till 1862 he held some minor appointments (as chaplain, &c.), but is known as author of a long series of works on Zoology, comprising a smaller and a larger *Natural History* (1852; 18th ed. 1891), *My Feathered Friends*, the *Common Objects* group, *Petland*, *Insects at Home*, *Insects Abroad*, *Man and Beast*, and *The Dominion of Man over Animals* (posthumously published). He died 4th March 1889. See the Life by his son (1890).

Woodbine, a name for the Honeysuckle (q.v.), given also to other climbers, such as some kinds of ivy, the Virginian creeper, &c.

Woodbridge, a market-town and river-port of Suffolk, on the right bank of the Deben, which

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expands into an estuary, 12 miles from the sea and 8 ENE. of Ipswich. The *Udebryge* of Domesday, and the seat of a 12th-century Augustinian friary, it has a fine Perpendicular church with a flint-work tower 108 feet high, a Flemish-looking town-hall, and the richly endowed Seekford almshouses and grammar-school—the former dating from 1587, and rebuilt in 1840 at a cost of £28,000. Bernard Barton and Edward FitzGerald were residents. Vessels of 140 tons can reach the town, which exports corn, malt, and bricks. Pop. 4600.

Woodburytype. See PHOTOGRAPHY, p. 152.

Wood-carving. See CARVING.

Woodchat (*Lanius rutilus* or *auriculatus*), a bird which, notwithstanding its name, is not a species of Chat, but of Shrike (q.v.). Its whole length is about 7 inches. The upper parts are mostly black, the under parts white; but there is a white spot on the wing when closed, and other small portions of the wing-feathers are white, as well as the outer tail-feathers, and there is a narrow streak of white above each nostril; the crown of the head and nape of the neck are rich chestnut red. It is a rare bird in Britain, but is abundant in the southern parts of Europe, where it breeds in summer, leaving the southern side of the Sahara for northern Africa in March. In food and habits it resembles other shrikes, only feeding more largely on insects and being fond of bathing.

Woodchuck. See MARMOT.

Woodcock (*Scolopax*), a genus of birds of the family Scolopacidæ, allied to the Snipes (q.v.), but of a more bulky body and with shorter and stronger legs. The Common Woodcock (*S. rusticula*) is comparatively abundant throughout Britain during the winter months, and a small but increasing number remain all the year round. The chief breeding-grounds of the woodcock are the great pine-forests of northern Europe and Asia, but in winter it is found as far south as the shores of the Mediterranean. The nest is formed simply by lining a sheltered hollow with dead leaves, and three or four yellowish eggs with brown markings are laid in March or early in April. The young birds are sometimes carried by the mother from place to place, and the manner of carrying has given rise to much discussion. Mr Charles St John says that

Woodcock (*Scolopax rusticula*).

from close observation he found that 'the old woodcock carries her young, even when larger than a snipe, not in her claws, which seem quite incapable of holding up any weight, but by clasping the little bird tightly between her thighs, and so holding it tight towards her own body.' The woodcock feeds in the early morning and at dusk on worms, beetles, small crustaceans, &c., the quantity of food consumed being very large. Its flesh is much prized, and besides falling to the gun of the sportsman it is caught by nets and snares placed in the 'cock-roads' or tracks made by the birds in going to and returning from their feeding-grounds. The adult bird measures about 14 inches, and weighs less than 1 lb. The general colour of the plumage is a warm ruddy brown with black spots on the upper parts, and yellowish brown with dark bars on the under parts. The American Woodcock (*S. minor*) is a smaller bird than the European species, and it also is in much request for table use. See Howard Saunders' *Manual of British Birds*.

Wood-engraving, or XYLOGRAPHY (Gr. *xylon*, 'wood,' and *graphō*, 'I write'), the art of engraving designs on wood, differs from copper and steel plate engraving by having the parts intended to print on the paper in *relief*. While *plates* are printed from the engraved lines by a laborious and necessarily slow process (see ENGRAVING), wood-engravings, having the object to be represented on the surface, in the manner of a type, may be printed along with the matter they are intended to illustrate in the ordinary printing-machine. This, of course, is an important point in the illustration of books, on the grounds of cheapness and expedition. Another advantage wood-engravings possess is that they can be multiplied to any extent by means of the electrotype process (see ELECTRO-METALLURGY).

The invention of wood-engraving, like that of gunpowder, has been claimed for the Chinese, whose books have certainly been printed from engraved wood-blocks for ages. It has indeed been asserted that the art of cutting figures in relief, and printing impressions of them on paper, was known and practised by that nation as early as the reign of the renowned Emperor Wu-Wang (1120 B.C.). There is no doubt that wood-stamps were used by the ancient Egyptians and Romans for stamping bricks and other articles of clay; and that wood and metal stamps of monograms, &c.,

Fig. 1.

were used in various European countries, for attesting deeds and other documents, at a very early period, when the ability to write was an extraordinary accomplishment even for princes. It is not, however, until the beginning of the 15th century that we find any evidence of the existence of

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appears to have been used in Germany at that time for printing playing-cards and figures of saints. The earliest print of which any certain information can be obtained was discovered in one of the most ancient convents of Germany—the Chartreuse of Buxheim, near Memmingen in Bavaria—pasted within the cover of a Latin MS.; it represents St Christopher carrying the infant Saviour across the ferry, and is dated 1423. Fig. 1 is a reduced fac-simile of this curious engraving. It is a work of some merit, notwithstanding its apparent roughness; the infant Saviour and the drapery of the saint being drawn with considerable skill and vigour. The Latin inscription at the bottom may be thus translated: 'In whichever day thou seest the likeness of Christopher, in that same day thou wilt, forsooth, die no evil death.—1423.' Shortly afterwards a series of books, printed entirely from wood-engravings, called block-books, were issued. They consisted principally of religious subjects, with short descriptions engraved on the same block. The most important of them were the *Apocalypsis, seu Historia Sancti Johannis;* the *Historia Virginis ex Cantico Canticorum;* and the *Biblia Pauperum* (q.v.). The illustrations, of which Mr Jackson in his treatise on the *History and Practice of Wood-engraving* gives an elaborate account and several specimens, seem to be drawn with a supreme contempt for perspective and proportion, but bear evidence of the draperies, and hands and faces, having been carefully studied. Fig. 2 is a copy of one of the engravings in the *Apocalypsis.* It represents St John preaching to three men and a woman, with the inscription: '*Conversi ab*

Fig. 2.

idolis, per predicationem beati Johannis, Drusiana et ceteri' (By the preaching of St John, Drusiana and others are converted from their idols). Fig. 3, from the *Biblia Pauperum*, is curious as showing the general manner of representing the creation of Eve during the 15th century, the same subject frequently occurring previous to 1500. Both have the appearance of careful drawings rather roughly engraved. Previous to the invention of movable types whole books of text were also engraved on wood, and the impressions had evidently been taken by *rubbing* on the back of the paper, instead of steady pressure, as in the printing-press, the ink used being some kind of distemper colour.

The Psalter printed by Fust and Schöffer at Mainz in 1457 is illustrated with initial letters engraved on wood, and printed in two colours, blue and red, which Mr Jackson considers 'the most beautiful specimens of this kind of ornament which the united efforts of the wood-engraver and

imitated in modern times, but not excelled.' It is worthy of note that, although printed upwards of 400 years ago, the freshness and purity of the colours remain unimpaired.

Fig. 3.

As printing spread, the publication of illustrated books became general in Germany and Italy, and reached England in 1476; in which year Caxton (q.v.) published the second edition of the *Game and Playe of the Chesse*, with figures of the different pieces. They are very rude compared with the earlier German works. Fig. 4 is a reduced copy of the 'Knight,' and is interesting as one of the first wood-engravings executed in England. Several works followed, all, however, executed in the same rude manner. The first attempt at something finer than simple lines appears in the frontispiece to the Latin edition of Breydenbach's *Travels*, printed at Mainz by Erhard Reuwich, 1486. It is by an unknown artist, and is an elaborate and really very beautiful specimen of the art. It is also remarkable as being the first engraving introducing *cross-hatching* to represent dark shadows. The *Hypnerotomachia Poliphili*, printed at Venice by Aldus in 1499, is worthy of mention for the extreme beauty of the designs, which have been ascribed by some authorities to Raphael, and by others to Mantegna. About the beginning of the 16th century a complete revolution in the art of wood engraving was accomplished by the genius of Albert Dürer. His productions exhibit not only correct drawing, but a knowledge of composition and light and shade, and attention to the rules of perspective, which, with the judicious introduction of subordinate objects, elevated them to the rank of finished pictures. Dürer, however, in common with most of the German artists of his day, paid very little attention to the propriety of costume in his religious subjects; one of his drawings in the *History of the Virgin* (1511), for instance, representing the birth of the Virgin, shows the interior of a German burgomaster's house of his own day, with a number of gossips drinking from flagons and otherwise enjoying themselves. There has been considerable discussion as to the probability of Dürer having also *engraved* his drawings. Most of the best authorities on the subject, including Bartsch, Jackson, and Firmin Didot, agree in the negative. Mr Jackson, who speaks with the experience of a practical engraver, says: 'In most of the woodcuts supposed to have been engraved by Albert Dürer we find cross-hatching freely introduced: the readiest mode of producing effect to an artist drawing on wood with a pen or a black-lead pencil, but which to the wood-engraver is attended with considerable labour. Had Albert Dürer engraved his own designs I am inclined to

his object by means which were easier of execution.' The reader is referred to the article DÜRER

Fig. 4.

for an account of some of his numerous works. The best of Dürer's contemporary artists on wood were the painters Hans Burgkmair (q.v.), Lucas Cranach (q.v.), and Hans Schäufflein. A series of works projected by the Emperor Maximilian were illustrated by these artists; but they are not equal to those of Dürer.

During the first half of the 16th century the publication of books illustrated with wood-engravings still increased, and prevailed to a greater extent than at any other time, with the exception of the present day. The superiority of talent, both in drawing and engraving, however, still remained with the Germans. In France, although their figure-subjects were inferior to those of their German neighbours, their ornamental borders in prayer-books, &c., of which a great number were printed at this time, were extremely beautiful. In Italy and England the art was very far behind. The most remarkable work published at this time was the *Dance of Death* (q.v.), issued at Lyons in 1538. The original edition of this curious work contained forty-one engravings, representing the struggle between Death, generally in the form of a skeleton, and different individuals, such as the Pope, the Emperor, a Judge, Monk, Doctor, Duchess, Old Man, &c. The drawings, which are characterised by great vigour and skill, are generally understood to have been executed by Hans Holbein (q.v.); but whether he also engraved them, as has been alleged, is more than doubtful. Towards the conclusion of the century, however, the art had made considerable progress in Italy, where some of the best productions of Germany were equalled, if not excelled. In England it did not make much progress. John Daye published almost the only illustrated books of the time, notably Queen Elizabeth's Prayer-book, which contains a tolerably well executed portrait of Her Majesty. There is no certain knowledge about any of the artists or engravers, although John Daye is supposed to have engraved some of his blocks himself. At this time also the practice of printing wood-engravings in colours from different blocks became somewhat common, although the attention of artists in that line was mostly confined to ornamental subjects. From the beginning of the 17th century the decline of wood-engraving may be dated, Germany, the cradle of the art, being the first to forsake it; the only works worthy of notice were a series of blocks on various subjects—designed by Rubens, and engraved by Christopher Jegher of Antwerp, one of which are of great beauty. From this time the art fell into a state of great neglect, not apparently for want of engravers, for woodcuts of a certain kind were always produced, but for want of artists able or willing to make drawings worthy of preservation.

Nothing particularly deserving of notice occurred until 1766, when John Michael Papillon, an enthusiastic professor of the art in France, published an elaborate history of the subject in an unsuccessful attempt to restore it to its former importance. But it was not until the genius of Thomas Bewick (q.v.) was brought to bear on it that wood-engraving received that impetus which has made it what it now is—one of the most important of the illustrative arts. Bewick's most important works are his *History of British Quadrupeds* (1790) and of *British Birds* (1804); all the quadrupeds and almost all the birds were drawn and engraved by himself. The birds especially are executed with a truthfulness and skill which has rarely if ever been equalled. These works are also famous for their collection of tailpieces, which display an infinite amount of humour and pathos. Fig. 5 is a reduced copy of one of them—a poor ewe, in the starvation of winter, picking at an old broom in front of a ruined cot—a scene, trifling as it seems, which tells a woeful tale of suffering. He entirely abandoned the elaborate system of 'cross-hatching' which prevailed so much

Fig. 5.

in the works of the older engravers, and produced his light and shade by the simplest possible means. The above example affords an excellent specimen of a wonderful effect being produced by a few simple lines.

Since Bewick's time wood-engraving has continued to flourish without interruption. He left behind him several pupils, the most successful of whom were Nesbet, Clennell (who engraved some of the tailpieces in the *British Birds*), and William Harvey. Harvey, however, forsook the burin for the pencil; and his drawings illustrating Milton's *Paradise Lost*, Thomson's *Seasons*, &c., especially such as were engraved by John Thomson (perhaps the most skilful engraver that ever lived, and a pupil of Robert Branston, a self-taught engraver), still retain a first-class place as specimens of wood-engraving. The establishment of the *Illustrated London News* (1842) tended greatly to familiarise the public with the beauties of wood-engraving. In the pages of that periodical appeared the first drawings on wood of (Sir) John Gilbert and Birket Foster. The spirited figure-subjects of the former and the exquisite landscapes of the latter did much to raise the art to the very high place it now occupies in England.

The closing quarter of the 19th century has been an important period in the history of wood-engraving, from the rise of what has been called the American school, which has had a considerable effect and many followers in England. It is typified in many of the finer illustrated magazines published in the

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United States and England, and much of their work is very beautiful.

At first their tendency was to use the burin to imitate something else, such as chalk or pencil drawings, which they certainly did with great fidelity; but this could scarcely be called the proper province of wood-engraving. W. J. Linton (q.v.), the veteran wood-engraver, in several works rated them soundly for what he considered their mistaken notions, and advocated a simpler style of line, such as used by himself with masterly skill. Though his advice was ridiculed, an undoubted change in this direction gradually took place, and as specimens of pure wood-engraving much of the more recent work is as near perfection as we may expect to see it. The professors of the arts of drawing and engraving on wood in the present day are so numerous, and their works generally so well known, that it would be needless, even if our space permitted, to attempt even to enumerate them.

Practice of Wood-engraving.—The wood used for engraving is boxwood, which has the closest grain of any wood hitherto discovered. It is principally imported from Turkey for the purpose, as the English box is too small to be of much use. It is cut *across* the grain in slices, which are dressed to the same height as type for convenience in printing. Inferior kinds of wood, such as American rock maple, pear-tree, plane-tree, &c., are used for coarser purposes; and for very large and coarse subjects, such as posting-bills, common deal is used, and cut on the *side* of the wood with chisels and gouges. When *blocks*—as the pieces of wood are termed—are required of a larger size than a few inches square it is necessary to join two or more pieces together, as the amount of *sound* wood to be got out of even a large slice is extremely limited. There is, however, for all practical purposes no limit to the joining process, as blocks have been printed consisting of from 50 to 100 pieces. The wood having been made very smooth on the surface, and squared to the required size, the surface may be prepared with water-colour Chinese-white, and the subject to be engraved drawn upon it in the usual way with brush and pencil; or it may be photographed on the wood from a drawing made on paper (see PHOTOGRAPHY, p. 153). The latter method has many advantages, and is almost universally employed. The drawing is not destroyed in the process as if executed on the wood, but can be used to refer to, in touching up the engraving, and it may be sold separately if of value. When the block is prepared with the drawing, or photograph, it is given to the engraver, who, previous to commencing, carefully covers it with paper, fastened round the edges with beeswax; this is necessary, to avoid rubbing the drawing out in the process. As the engraving proceeds he gradually tears the paper off.

The tools or gravers necessary in wood-engraving are of many varieties, from those with fine points to cut fine lines, ranging through all sizes up to small chisels to cut out the wide white pieces. Fig. 6 represents the method of using the graver. Most engravers use a glass of slight magnifying power, more for the purpose of relieving the eyes from the strain of fixing both eyes closely on a small object than for magnifying the work. When gas or other artificial light is used a glass globe filled with water, slightly tinted with blue (to neutralise the reddish glare of the light), is placed between the flame and the work: this serves the double purpose of concentrating the light on the block and keeping it out of the eyes. When the drawing is in outline, or mostly so, the engraving is very simple; the process consists of engraving a line along each side of the pencil lines, which are, of course, to be left in relief, and afterwards cutting out the pieces between. It will thus be understood that every part of a woodcut which prints on the paper

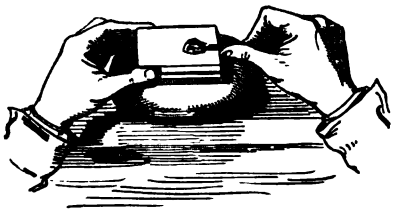

Fig. 6.

is the surface of the wood left untouched, and that every white part is cut or hollowed out. Fig. 7 represents a little subject *outlined;* fig. 8 is the same subject *finished.* When it is complicated with much shading, trees, &c., it becomes much more difficult, and brings into play the artistic talents of the engraver to preserve the proper shades, or *colour*, as it is technically termed, and texture of the different objects, the most skill being required where the drawing has been executed entirely or mostly by brush-work, and the execution is left entirely to the engraver. By a judicious

Fig. 7.

Fig. 8.

use of his various tools, cutting out or leaving the lines thicker or thinner, marvellous effects may be produced by very simple means. Some of the finer portraits entirely engraved from photographs from life, which may be seen in many of the better-class magazines, are wonderful instances of this skill, and are worthy of careful study.

When the drawing is all engraved, a proof is taken by inking the surface gently with printing-ink on a dabber (a ball of cotton covered with silk or leather), and, a piece of *India-paper* being laid on it, by rubbing the paper with an instrument called a *burnisher* until it is all printed, or, where the block is large, printed in a small press. The engraver then sees what touching up it requires before it is finished and ready for the printer.

When large blocks are to be engraved the pieces of wood are joined with screw-bolts, and the drawing prepared in the usual manner; after which the pieces can be taken separate for convenience in engraving, and also for the purpose of getting it quicker finished by having an engraver working at each piece—a matter of some consequence in many cases, as, for example, in the large engravings in the illustrated newspapers.

For mechanical processes of reproducing drawings, see ILLUSTRATION OF BOOKS. See also ENGRAVING, PHOTOGRAPHY, PRINTING, &c. See Hamerton's *Graphic Arts* (1882); Woodberry's *History of Wood-engraving* (1883); Marx's *Wood-engraving* (1881); Linton's *Wood-engraving in America* (1882); Jackson and Chatto's *History*

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Papillon's *Traité de la Gravure en Bois* (1766); Bartsch's *Peintre-graveur*; Ottley's *Inquiry into the History of Engraving on Copper and Wood*; Firmin Didot, *Essai sur l'Histoire de la Gravure sur Bois* (1863); and W. J. Linton, *The Masters of Wood-engraving* (1891).

Wood-evil. See CONSTIPATION.

Woodhouselee. See TYTLER.

Wood-ibis. See TANTALUS.

Wood-lice (*Oniscidæ*), a family of terrestrial Crustaceans included in the order Isopoda. The body is more or less oval in outline and flattened; the head bears a long pair of antennæ, another rudimentary pair, a pair of lateral eyes, and jaws; the thorax bears seven pairs of walking legs; the abdomen has six pairs, of which the first five overlap like tiles, and the most anterior are modified to contain air. All live on land, in more or less damp places, hiding during the day, seeking their food in the darkness. The reproductive processes are very complex. When the female is impregnated in spring, she receives the male elements in two sperm-sacs; these burst into the closed oviducts; a moulting takes place, and a genital aperture is formed on the body-wall; the fertilised ova burst from the oviducts into the body-cavity, and pass out by the genital slit into brood-chambers on the legs; when the hatched young leave the brood-chamber another set of ova are squeezed into it; after all is over the female moults again and acquires its original characteristics. About 18 genera and 250 species are known—e.g. *Oniscus murarius* (known in Scotland as *Slater*), common under stones; *Porcellio scaber*, equally common; *Armadillidium vulgare*, able to roll itself up into a ball; *Ligidium personii*, frequent among damp moss and rotten wood; *Ligia oceanica*, on rocky shores. The wood-lice are vegetarian animals, eating both fresh and decaying plants, and some do harm in gardens.

Wood-louse (*Oniscus murarius*).

Wood-naphtha. See PYROXYLIC SPIRIT.

Wood-oil. See GURJUN BALSAM.

Woodpecker (*Picidæ*), a family of birds in the order Picariæ, remarkable for the structural modification of the skull in adaptation to its use as an axe, and for the long, flexible tongue, which is used for extracting insects from holes and crevices of trees. The family embraces at least 250 species, which are most numerous in South America and the Oriental region, less abundant in Africa and North America, and altogether absent from Australia. The members of the typical sub-family Picinæ have stiff tail-feathers; the bill moderately long, broad at the base, hard and pointed at the tip; the toes in pairs, two in front and two behind, with strong, sharp, hooked claws; the tongue capable of being protruded far beyond the bill, and furnished at the tip with horny, barbed filaments. The food consists for the most part of timber-haunting insects, and it is in the effort to discover and dislodge these that the characteristic tapping sound is made. But the woodpecker does not confine itself entirely to trees; it feeds occasionally on ground-insects, and some species are known to eat nuts and berries. The nest is simply a hole pecked out in a tree, such as the beech, of which the wood is comparatively soft, and no lining, except a few chips, is placed inside. Only three species of woodpecker occur in Britain, and none of these is very abundant except in a pecker (*Gecinus* or *Picus viridis*), often called the Yaffle, Woodweele, or Rainbird—the last name referring to its most frequent note, 'a loud, laughing *plew, plew, plew*, popularly supposed to foretell rain.' This species is found in wooded districts in England; it is rare in Scotland, and almost unknown

The Green Woodpecker (*Gecinus* or *Picus viridis*).

in Ireland. The adult bird measures 12 inches; the prevailing colour of the plumage is green—dark olive on the upper, pale green on the under parts; the crown and back of the head are bright crimson. The Great Spotted Woodpecker (*Dendrocopus major*) and the Lesser Spotted Woodpecker (*D. minor*) are chiefly confined to the southern and midland counties of England. The former species is about 9 inches in length, the latter only 5; in both the prevailing colours of the plumage are black and white, the male having crimson markings about the head.

Of the numerous American species the Flickers (Colaptes), the South American Ground-flickers (Soroplex), which live chiefly on termites, and the Great Ivory-billed Woodpecker (*Campephilus principalis*) may be specially noted. The last-named species, which inhabits the dense forests of the southern states, is one of the handsomest of the group, and was called by Linnæus the Prince of Woodpeckers, but as it is nowhere abundant, and is very wary, comparatively little is known of its habits. The Piculets (Picumninæ) form a distinct sub-family. They are very small, and the tail is short and not stiffened. About twenty species occur in South America and several in the Oriental region. As far as is known their habits resemble those of the woodpeckers proper. Also allied are the wrynecks (Jynx), which are restricted to the Old World.

It has been much discussed whether woodpeckers are injurious or not, but no general statement can be made, their habits varying with the species, the country, and the season. They are blamed for attacking trees, stealing seeds and fruits, and eating useful insects, such as most ants; but the trees they attack are usually not sound, and they destroy enormous numbers of injurious insects.

In Roman mythology Picus was supposed to have been turned into a woodpecker by Circe because of his love for Pomona.

Wood-preserving. See TIMBER.

Woodruff (*Asperula*), a genus of plants of the natural order Rubiaceæ, containing a number of annual and perennial species, with whorled leaves, natives of the northern parts of the Old World, and distinguished by a funnel-shaped or

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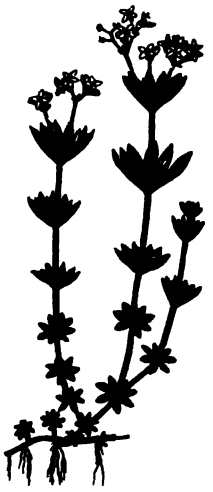
bell-shaped corolla, a bifid style, capitate stigma, and dry didymous fruit. The Sweet Woodruff (*A. odorata*) is common in shady woods in Britain and all parts of Europe. It has a creeping root, a stem 5 to 10 inches long, weak and sub-erect, four or five whorls of lanceolate leaves, six to eight in the whorl, rough at the edge and keel, and small white flowers. The plant, when dried, has a very agreeable fragrance, similar to that of *Anthoxanthum odoratum* (see VERNAL GRASS) under similar circumstances. It forms an agreeable herb-tea, and enters into the composition of the popular *May-drink* of the Germans. —Dyer's Woodruff (*A. tinctoria*) is a native of the continent of Europe and of Siberia, a perennial, with reclining stems about a foot in length, whorls of six or four linear leaves, the upper leaves opposite, the flowers whitish. The root is used in Dalmatia and elsewhere instead of madder; but the crop obtained from a field is inferior in quantity to madder.



Sweet Woodruff (*Asperula odoratam*).

Woods and Forests. In ancient times the principal part of the royal revenues of England consisted of the rents and profits of the crown-lands, which were composed of numerous lordships and honours, with forests and chases. The demesne lands reserved to the crown at the Conquest were at one time very extensive; but while they were often added to by forfeitures, they were also so largely encroached on by grants to subjects that from the 12th to the 14th century parliament had often to interpose to compel the resumption of grants thus made. The confiscation of the property of the monasteries under Henry VIII. greatly increased the real estate of the crown; and, notwithstanding alienations by that monarch, and by Queen Elizabeth, who disposed of part of the royal domains to avoid application to parliament for supplies, the crown at the accession of James VI. owned very extensive estates all over England. The profusion, however, of James and his successors reduced the royal estates to insignificance, and no effectual restraint was imposed on their dilapidation until statute 1 Anne, chap. 1, prohibiting all alienations of the crown-lands, except by leases not exceeding thirty-one years, or three lives. From the reign of Henry VIII. to that of George III. the crown revenues were subjected to repeated changes of management; and under George III. the system was first introduced of surrendering the greater part of them to be consolidated with the rest of the public revenue, out of which the royal civil list is paid. The modern administration of the land revenues of the crown is founded on a statute of 1810, establishing a Board of not less than two or more than three Commissioners, called 'The Commissioners of His Majesty's Woods, Forests, and Land Revenues.' The law relating to the management of the crown-lands was consolidated by an act of 1810, which, repealing a number of previous enactments on the subject, placed the whole hereditaments of the crown in England, Wales, and Ireland, except advowsons and vicarages, under the management of the Commissioners of Woods and Forests, with large power of selling and leasing them; and provided that the annual land revenues should, subject to certain deductions, be carried to the Consolidated Fund during the king's life. This transfer to the Consolidated Fund, the result of a special agreement terminating with the life of the sovereign, has been renewed with his successors. In 1832 the Treasury was empowered to transfer to the Commissioners of Woods and Forests the management of the crown-lands of Scotland. In the same year parliament abolished the office of Surveyor-general of His Majesty's Public Works and Buildings, and entrusted to the commissioners the management of the public works. This union, however, was afterwards considered inexpedient, and in 1851 the department of Public Works was placed under separate control. An act of 1866 introduced various alterations in the details of management. The Commissioners of Woods and Forests act under the control of the Treasury, and are required to transmit annual accounts of the receipt and expenditure of their department, to be audited by the Commissioners for auditing Public Accounts. The net yearly receipts from this source amount to about £430,000. See WORKS (BOARD OF).

Wood's Halfpence, a copper coinage for Ireland granted by the English ministry in 1722 to William Wood. He was to share the profit from the difference between the nominal and the intrinsic or bullion value of the coins with the king's mistress, the Duchess of Kendal, who had secured the patent for Wood. Against the whole transaction the *Drapier's Letters* of Swift (q.v.) raised such public indignation that the patent was cancelled, and Wood compensated by a pension.

Wood-sorrel. See OXALIDÆ.

Wood-spirit. See PYROXYLIC SPIRIT.

Woodstock, a market-town of Oxfordshire, on the Glyme, 8 miles NNW. of Oxford. It was a royal manor from Saxon times until 1705, when it was granted to the Duke of Marlborough, whose seat, Blenheim Park (q.v.), is close by. Hence it has many memories, as the birthplace of the Black Prince (though not of Chaucer), as the scene of Becket's first quarrel with Henry (if not of Fair Rosamond's murder), as the place of captivity where Elizabeth wished herself a milkmaid, and for the pranks of its 'merry devil' on the parliamentary commissioners in the old manor house, which was pulled down in 1723. A municipal borough, chartered first by Henry VI., and last in 1886, Woodstock till 1832 returned two members to parliament, and then till 1885 one. It still carries on leather glove-making. Pop. 1628. See E. Marshall's *Early History of Woodstock Manor* (2 vols. 1873–74).

Woodstock, a port of entry and capital of Oxford county, Ontario, on the Thames, 88 miles by rail SW. of Toronto, with a Baptist seminary and considerable trade. Pop. 5373.

Wood-swallow, an Australian name for any of the fly-catching Artamidæ, also called Swallow-shrike—the resemblance to shrikes being considerably closer than to swallows either in appearance or habits.

Wookey Hole, a cave near Wells, Somerset, situated in dolomitic conglomerate. When discovered it was filled to the roof with debris, in which were found bones smashed and splintered and scored with tooth-marks of the hyæna, whose remains largely preponderated. The cave appears to have been a hyæna's den. Amongst other species represented were horse, rhinoceros, deer, bear, ox, mammoth, lion, fox, wolf, and lemming. Man's presence was shown by the occurrence of Palæolithic flint-implements.

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Wool. From the earliest historic times wool has been used in the construction of yarns or threads, which by the process of weaving—i.e. the act of interlacing two series of yarns crossing each other at right angles—have been converted into textiles possessing clothing properties. With the progress of civilisation and the development of the *beaux arts* wool became the staple material of many of the costly and elaborately-ornamented textures produced conjointly by the weaver and the embroiderer for embellishing the temples of the gods and the palaces of royalty. The collections of Egyptian and Persian fabrics in the Musée d'Art et d'Industrie at Lyons and in the British Museum, dating back to the 4th century of the Christian era, contain various woven specimens of decorative and other textiles, in which wool is the principal fibre, and whose individual threads are spun to such a degree of fineness or extenuation as to bespeak considerable skill in the manipulation of this material. According to Herodotus the tunics of the Babylonians were composed of woollen yarns; Homer refers to Thrace as 'the mother of flocks;' and Plato mentions the working of wool by the crossing of threads, thereby producing a tissue. As to the Romans there are many facts extant which indicate that they understood the whole art of wool manufacture as manually performed. In the ruins of Pompeii there is a complete plant of scouring, fulling, and pressing apparatus, and though it is of an extremely primitive character, still it shows that centuries ago these sections of cloth manufacture formed a specific art, and also that the felting property of wool, which distinguishes it from all other fibres, whether of an animal or of a vegetable character, was then taken advantage of in the construction of 'wool' as distinct from linen and cotton fabrics. During the period that Britain was a colony of Rome a woollen factory was established at Winchester. Although it is highly probable that the ancient Britons before the invasion of the Romans were familiar in a rude fashion with the handicrafts of spinning and weaving (it is recorded that Boadicea wore a tunic checked with a variety of colours, presumably of British manufacture), yet this Roman factory must have been instrumental in placing the weaver's art on a more efficient basis than hitherto.

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Not only were the ancients acquainted with the scheme of manufacturing fabrics by weaving threads together composed of wool, but they also made, by pounding the fleece of filaments in a damp condition, a species of *felt*. Pliny accredits the Gauls with carrying on this kind of wool manufacture, stating that they produced a cloth without spinning or weaving. This must have been obtained by submitting the wool to similar chemical and mechanical conditions as are attained in the manufacture of *felts* for hats, carpets, and shoes in modern times; for the felting or fulling of wool (see below) can only be acquired by adopting a certain routine as to moisture, pressure, and temperature. It seems probable that succeeding the use of the skin of the sheep as a covering or wrap would be this type of cloth, for it is far more easily produced than the more complex texture yielded by the loom. In its construction only one process, and that an extremely simple one to perform, is necessary, whereas to make a woven fabric the wool has to be carded, spun, prepared for weaving by warping, beaming, healding, and sleying, and, lastly, formed into a texture by interlacing shoot after shoot of weft with a limited number of threads of warp. But it may be supposed that the readiness with which wool can be made to assume a weavable thread would at an early period in the history of woven manufacture suggest it to the ingenious craftsman as suitable material for textile purposes.

In the middle ages, when Flanders was the great headquarters of manufactures in wool, English wools were held in great esteem, and, in spite of frequent laws, especially from the time of Edward III., to prevent exportation, were largely purchased by the textile producers of that country. The wool-workers and weavers of Ghent and Bruges asserted themselves in war and politics against Burgundy and France. At various dates Flemish wool-workers settled in England, and taught the English, as they also taught the French, the art they had carried to so great perfection. The remarkable enactment of Charles II., that every Englishman should be buried in a woollen shroud, which was in force from 1678 till 1815, contributed in a measure to the growth of woollen manufacturing as a great native industry. Wool-working in factories and on a commercial scale was not established in the United States till about the end of the 18th century.

The accelerated development of the textile industry, especially during the 19th century, has resulted in an enormous increase in the growth of wool. Up to 1850 the wools used in Britain in the manufacture of woollen and worsted fabrics, in addition to those of home growth, were chiefly imported from Spain and Germany. Now the principal wool-growing countries are as follows: Australia, New Zealand, Tasmania, Cape Colony, South America, and India. Of course England, Scotland, France, Germany, Spain, and Russia all produce limited quantities of wool; but, with the exception of small portions of Saxony and Silesian wools that are used in the west of England in the manufacture of the finest doeskins and kerseymeres, British textile producers are dependent chiefly upon the colonies of Australia, New Zealand, Tasmania, and the Cape for their wool-supply. The wools of England are not without their uses. Those of Southdown, possessing a fine fibre, and, as compared with the merinos of Australia, a small degree of felting property, are highly suitable for flannels, and are therefore largely purchased by the manufacturers of these goods; Lincoln and Leicester wools, on account of their lustrous qualities, are employed in the dress and mantling trades; and the strong, useful wool grown on the Cheviot Hills is utilised in the manufacture of that extensive class of fabrics known as 'cheviots.'

In mechanical structure the wool fibre is cylindrical in shape, being composed of an infinite number of minute cells. The central part or core of the fibre is ensheathed (*a*, fig. 1) with numerous

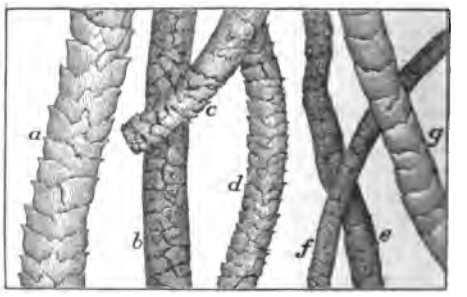

Fig. 1.

a, typical wool fibres; *b*, mohair; *c*, 'kempy' fibre; *d*, merino wool; *e*, shoddy; *f*, cashmere; *g*, Lincoln wool.

scales or thin plates more or less funnel-like in shape, and one overlapping the other. Wool is frequently defined as a species of hair, but it differs from this filament in possessing a more fully-

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developed serrated circumference, and an increased degree of flexibility, waviness, and elasticity. Even these features of dissimilarity are obvious when wool and mohair (the product of the Angora goat) are compared. Fibres *a* and *b* in fig. 1 show the difference in external structure. In *a*, which is a typical wool fibre, the scales are clearly defined, appear in some cases to encircle the filament, and fit one into the other; but in *b* these serrations are less prominent, and the fibre is straighter, and therefore comparatively deficient in waviness. Cashmere, a fine, downy material yielded by the Tibetan goat (*f*, fig. 1), also lacks that well-defined structure which characterises true wool. Microscopically they possess a similar but far from an identical formation, and in the actual work of manufacture the difference between these several fibres is emphasised at every stage of procedure, resulting in the construction of fabrics of distinct qualities, and each used for a specific purpose.

On examining the wool fibre more minutely it is found to consist of three principal parts: (1) the outer scales; (2) the inner bark or cortical substance; and (3) the medullary or central portion. The external scales may be defined as flattened horny cells. They form the sheath or bark of the fibre. Their dimensions, uniformity, soundness, and compactness determine the lustre, firmness, and strength of the wool. The felting or fulling power is also primarily due to their presence in the fibre, being high or low in proportion to their multiplicity and strength. These marginal scales are the most numerous in fine wools, and, as indicated in relation to wool, mohair, and cashmere, differ so largely in formation and arrangement in different types of wools to make it feasible in some instances to distinguish the variety of fibre examined by its serrated surface. The interior of the filament is composed of spindle-shaped cells. Upon the density of these cells—which form the largest proportion of the fibre—the elasticity and trueness of the wool depend. Moreover this part of the fibre is said to possess greater affinity for colouring agents than the external scales, a fact which is proved by the readiness with which 'extract' wools—materials which have been recovered from woven fabrics composed of cotton and wool, by steeping the textures in a bath of diluted sulphuric acid, which destroys the vegetable fibre and leaves the animal fibre intact—can be dyed, and such extracted wools have these interior cells exposed to a considerable degree. The third or medullary part of the wool filament consists of several layers of oval cells which form the pith or core of the fibre. Occasionally these run the entire length of the hair, but they may only occur at intervals. Their functions in the structure of the fibre have not been fully determined.

Fig. 2.—A lock of merino lamb's wool, showing the wavy character of the fibre.

When selecting wool for manufacturing purposes regard is paid to its strength, length, soundness, and elasticity of staple, fineness of hair, and lustrous and felting properties. By 'staple' is meant a lock or strand of fibres (fig. 2). Its several qualities are determined by the touch. An indication of soundness is uniformity of growth in the several filaments of which the staple is composed. Fibres with the greatest diameter will necessarily sustain the most tension, but the tenacity of a sample of wool is not judged by the thickness of individual hairs, but by the strength of the lock. If the fibres are considered separately, Lincoln wool, in point of strength, is far superior to Australian merino, as its breaking strain, according to Bowman, is 502 grains, while the Australian is 50 grains; but it is possible to acquire from the latter wool a cloth capable of sustaining greater strain and friction than can be obtained from the Lincoln. This is partially due to the fact that the merino is ranker in growth, the staple being more compact, and also to the superior felting power of this wool, a quality which imparts increased wearing strength to woollen fabrics.

Elasticity of staple is the power the wool possesses to assume its normal condition immediately on pressure being removed. A quantity of cotton when unpacked lies comparatively solid, but on unpacking a bale of wool it rebounds and expands. This elastic or flexible property is present in the largest measure in wools of a crimpled, wavy form (fig. 2); and, generally speaking, the finer the wool the more fully does this curliness of fibre obtain. Merino wools, for example, contain a large number of curves in a given length of hair, and are remarkable for elasticity and density of staple. Fullness and 'kindness' to the feel, and warmth and comfort in the wear are some of the qualities which the finished cloth derives from this primary property of a good clothing wool.

Lustre of fibre is essential in making certain classes of worsted yarns, and dress and mantle fabrics. Lincoln and Leicester wools are celebrated for their lustrous or shiny appearance. They are only excelled in this particular by mohair and alpaca. Straightness of fibre in combination with an outer sheath of serrations, characterised by a high degree of uniformity and regularity in the size of the individual scales, give to these materials their lustrous quality. Fineness of hair is most important in making fine yarns. A thick-fibred wool will not spin to a great length, and cannot therefore be used in the manufacture of superfine cloths. It may be utilised in medium-class fabrics, but it does not form the requisite smallness of hair to be spun into high counts of yarns which alone can be used in the production of textures fine in structure or containing a large number of threads to the inch.

Wool Substitutes.—The principal substitutes for wool used in making so-called woollen fabrics are noils, mungo, shoddy, extract, and flocks. Formerly mungo, shoddy, and extract were regarded purely as waste and unusable products. Now they are the chief materials employed to cheapen textiles. *Noils* are the curly neppy filaments rejected in preparing wool for worsted yarns by combing. They are pure wool, and are a valuable material. *Mungo* is a product obtained by grinding up tailors' clippings and cast-off garments from which all cotton threads have been extracted. The only difference between *mungo* and *shoddy* (*e*, fig. 1) consists in the latter being the result of treating soft rags, such as blankets, stockings, and comforters. Both are important materials and are extensively used by the manufacturers of Dewsbury, Batley, Guiseley, and Yeadon. *Flocks* are the fibre which leaves the pieces during scouring and milling. A few decades ago they were in large demand, but owing to the introduction of other and cheaper substitutes, changes in fashion, and the decline in the quality of all-wool fabrics they do not now occupy the same prominent place in the materials at the command of the woollen manufacturer as formerly.

WOOLLEN CLOTH MANUFACTURE.—When the wool arrives at the factory it is in the fleece or

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unsorted condition, and is a promiscuous blend of all kinds of fibres, such as fine and coarse, strong and tender. A single fleece may contain as many as thirteen or fourteen sorts, but in practice it is not generally necessary to make more than five or seven qualities. The choicest wools are derived from the sides and shoulders of the animal, and the inferior classes from the head, the throat, and the shins. A good wool, though not so fine in the fibre and soft to the touch as that grown on the sides, is found on the lower part of the back. Sound intermediate qualities are obtained from the rest of the back and the loins. The wool on the belly is short, dirty, poor in quality and frequently tender, while that coming off the lower parts of the legs is usually burry and possesses a thick fibre and a staple deficient in waviness and elasticity.

The sorter commences the operation of sorting by ascertaining if the fleece in hand is that of a *hog* or *hogget*, or that of a *wether*. The former is *lamb's* or *yearling's*, and the latter *fleece* wool. They are readily distinguished from each other by the character of the tips or ends of the fibres, those of the hog being pointed on account of the animal not having been previously shorn, whilst those of fleece-wool increase in bluntness each succeeding year. Analysis of the fleece is commenced by spreading it over a table with a wire-cage surface. During sorting a portion of the dust and other hard particles of matter liberated from the wool fall through this cage into a drawer beneath. An indefinite line is formed down the middle of the fleece which the sorter follows in dividing it. His work is of a twofold character. First, he removes a portion of the foreign substances which the fleece contains, and also clips away the hard, clotted tufts of fibres which in the process of growth have become fast adhered together. Secondly, he proceeds to carefully analyse the fleece, classifying the locks according to quality, and casting them into different skeps with which he is provided. The wool is principally judged by its softness of handle and its density of growth. 'Tenderness of staple, unkindness of feel, and want of rankness of hair are all indications of an inferior wool.'

In its natural state wool is impregnated with a greasy compound designated yolk or suint. The object of the succeeding process of manufacture—scouring—is to remove this substance without injuring the staple of the wool. When this work is properly done the material is not only clean and a perfect white, but appears elastic and open. The principal requisites here are a pure, soft water, a mild alkali, uniform temperature of the 'scour,' and as small a degree of mechanical agitation of the wool in washing as is compatible with the thorough cleansing of the fibres. Scouring is effected in machines specially designed for this purpose. They consist of two or more tanks containing the 'scour' or alkaline lye, in which the wool is immersed and gently made to travel from the receiving to the delivery end of the separate tanks, when it passes between a pair of squeezing-rollers, and from thence is conveyed to the drying chamber. An indifferently scoured wool does not dye a clean colour, and yields an imperfect yarn and an unsatisfactory cloth.

If the material is intended to be *wool-dyed* it is now transferred to the dye-house, but in some instances dyeing takes place in the yarn state, and in others in the woven piece. When preparing wool for *mixture* fabrics the material is dyed before spinning; in some styles of medium and high-class fancies *hank-dyeing* is preferable; while in the simple makes of cloths, or textures of one shade, it is more economical to dye in the piece. Whichever system of dyeing is practised the wool, after scouring, is teazed or *willeyed*. This is a mechanical operation, and is performed with the object of opening and disentangling the felted meshes of the wool. Really this is a preliminary scribbling or carding. The *teazer* or *willey* consists of a large skeleton cylinder mounted with ten arms, each studded with two rows of teeth tapering from the base to the point, and of three smaller rollers termed 'workers' fixed over this cylinder, and also studded with metal teeth which intersect and work between those of the main cylinder when the machine is in motion. The attendant regularly distributes the material on the feed-sheet or endless apron which conveys it to the interior of the machine, where it is engaged by the teeth of the large cylinder making from 400 to 500 revolutions per minute. It travels in the opposite direction to the 'workers,' which only make from 30 to 40 revolutions per minute. Consequently, it has no sooner become charged with wool than the fibres are forced forward to be engaged and 'worked' or opened by the small rollers. This process is continued until the filaments have become sufficiently separated to be in a suitable condition for *oiling*.

One effect of removing the yolk from the wool has been to deprive it of its natural lubricant, and to make it too diffusive and dry to be treated economically without oiling in the subsequent operations of scribbling, carding, and spinning. Oil renders the fibres soft and flexible and preserves their serrated structure and natural length when operated upon by the millions of wire teeth in the carding machines. If a quantity of unoiled material were submitted to the scribbling process two unsatisfactory consequences would ensue. First, the wool would be imperfectly scribbled for the want of those lubricants which facilitate the separation and readjustment of the filaments effected by the scribbler. Secondly, the amount of waste material in the form of flyings and droppings—loose fibres given off by the various cylinders of the scribbling-engine—would be perceptibly augmented. Wool is, therefore, oiled at this stage to soften and smooth its filaments, to impart adhesiveness, and thus at once minimise the loss of valuable material which would otherwise occur in this severe operation. Various compositions are used as lubricants, but the principal are olive or Gallipoli oil and oleine.

The oil is applied manually by spreading the wool in layers on the floor and adding a sprinkling of oil to each layer, or automatically as it passes on to the *fearnought*. This machine is also termed

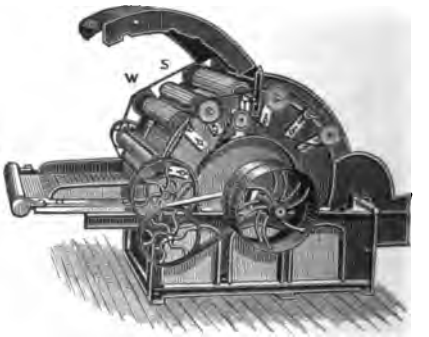

Fig. 3.

the tenter-hook willey, a name which has been applied to it on account of the peculiar form of teeth inserted in its main cylinder. A representation of this machine is given in fig. 3. Essentially it is a minute scribbler possessing three pairs of small rollers, W and S, called workers and strippers,

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glean the wool from the teeth of the swift, and 'work' or intermix and open the fibres between them, ultimately yielding them up to the large cylinder again, which conveys them to the next pair of small rollers, where the process of opening and mixing is repeated. This work is also continued by the third set of rollers, when the wool is once more recovered by the swift and passed on to the fan, which removes it from the machine.

At this juncture the material is prepared for scribbling or carding proper. This process is distinctly a continuation of the treatment to which the fibres have been subjected on the *teazer* and *fearnought*, only the machinery used is more searching in its action, and literally separates fibre from fibre. While disentangling the locks of wool and disintegrating felted meshes of filaments which

vious machines or only been partially operated upon by them, it at the same time reblends the fibres by recrossing them at every conceivable angle, uniting in the process long and short, coarse and fine, curly and straight, and producing by their amalgamation a continuous sheet or texture of filaments of uniform delicacy and density throughout its entire length and breadth.

The scribbling machine (fig. 4) is a combination of cylinders of various diameters, and revolving in opposite directions and at varying speeds. Each roller is covered with *card-clothing*, or with fine, pliable wire teeth. A sample of *clothing* is shown in CW, fig. 4. Obviously, as the wool is transferred from cylinder to cylinder it will be repeatedly opened and reblended, and by degrees made to assume a light, flossy, and workable condition, or

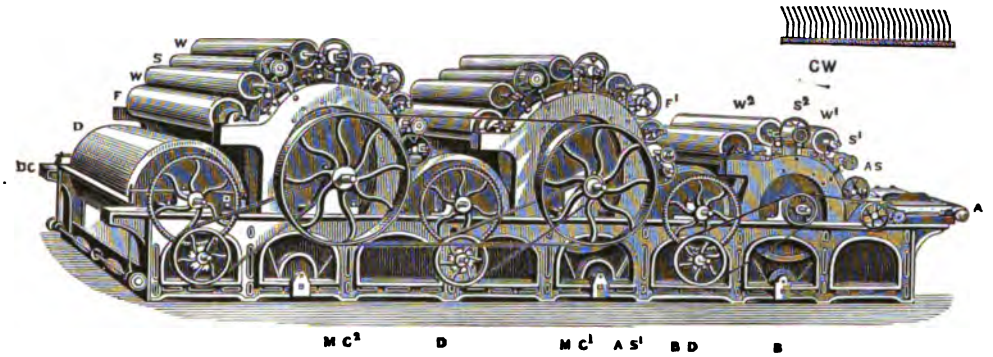

Fig. 4.—Scribbler:

A, feed-sheet; AS, breast angle stripper; W, workers; S, strippers; F, fancy; AS¹, first angle stripper; B, breast cylinder; BD, breast doffer; MC, main cylinder; D, doffer; DC, doffing comb; CW, card-clothing.

one which may be readily changed into a weavable thread. The amount of dislocation and blending the fibres are subject to in their passage through an ordinary scribbler is almost incredible. It may be understood by considering the immense multitude of points which are incessantly operating on the wool. A machine similar to that represented in fig. 4 contains no fewer than 56,000,000 teeth. These have various functions: 50,000,000 engage the material and convey it from stage to stage, resisting in so doing the action of the teeth of adjacent cylinders which may have become charged with fibres. The remaining 6,000,000 are designated extractors and springers, and lash or draw the wool from between the card-wires of other rollers. In a scribbler mounted in this manner the material is continually operated upon by the dividing and remixing action of 25,000 points. This is not all. A set of carding-machines contains two or three engines, whose rollers all possess card-clothing of increasing fineness, so that by the time the wool escapes from this process a complete disturbance of the natural order of the fibres has been effected, and they have, moreover, been readjusted with such mechanical precision as to be readily convertible into a spun yarn.

The passage of the material through the scribbler may be thus described. It is primarily spread by an automatic appliance on the feed-sheet (A, fig. 4). Before being transferred on to the breast cylinder it undergoes a certain amount of opening and blending, which tends to keep up a uniform supply of fibres. This is accomplished by five small rollers, three of which are called 'feeds,' one the 'licker-in,' and the fifth the 'angle stripper.' The three 'feeds' are fixed one above the other, directly behind them is placed the licker-in, and over it the

angle stripper. The wool is no sooner carried by the feed-sheet on to the lowest feed-roller than the licker-in removes a portion of it, which it commences in conjunction with the centre 'feed' to open and intermingle. It is at this point the third or uppermost feed-roller comes into action, and that the angle stripper takes charge of the material and conveys it to the breast cylinder. Here the real work of scribbling is initiated. The card-wire of the cylinder carries the wool forward until it is engaged by the first pair of small rollers (S^1 and W^1, fig. 4). The worker, though placed behind the stripper, gleans the fibres off the cylinder, while the stripper removes or *strips* it from the worker, and in turn yields it up to the rapidly revolving cylinder. It is not the design of the scribbler to accomplish at one process a perfect separation and blending of the filaments, for in so doing it would be liable to break the staple of the wool; hence the several small cylinders employed in disentangling and remixing the fibres. The first pair of rollers are only intended to operate upon the largest entanglements, being set the farthest away from the cylinder, and also the coarsest in card-wire. The material which escapes their points is dealt with by the second couple of rollers (S^2 and W^2, fig. 4), while the smaller tufts of fibres still are engaged by the third set of workers and strippers, and so on throughout the operation. By this repeated transfer from one cylinder to another a continuous opening and mingling of the filaments is carried on from the time they enter the machine at the feed-sheet till they leave the same at the doffer.

Condensing follows scribbling and carding. There has been no attempt made thus far to impart to the wool a thread-like appearance. It is removed

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from the last cylinder of the carder by the condenser, whose office it is to divide the sheet of filament into narrow bands, which are passed between a pair of rubbers. These have an action similar to that of the palms of the hands when rubbed together, and give to the several strips or 'slivers' a round form—indeed, convert them into thick, soft, fluffy yarns, incapable of sustaining any degree of extenuation because absolutely free from twist or twine.

Such 'slivers' or condensed threads form the germ of the spun yarn. Spinning (q.v.) is the final process in thread-making. The 'condensed slivers' pass, in the spinning-frame, between a pair of fluted rollers, and from thence to the spindles, which are fixed in a movable carriage. Primarily the rollers give out a length of 'slivers'—the carriage and the spindles receding and the latter imparting twist—and next, the rollers cease to revolve and the spindles increase in velocity, the carriage meanwhile travelling to the end of its traverse. During the latter part of its movement the thread is extenuated or reduced in size, and the final degree of twist is inserted. On the return of the carriage the spindles wind up the spun yarn in 'cop' form.

As weaving is treated of in a special article, the cloth has now to be followed after it leaves the loom, in which condition it is spoken of as being in the 'balk' or raw state. The characteristics of this state are threadiness of surface, looseness of structure, hardness of handle, and lack of smartness of pattern or beauty of design. To make the pieces saleable they are submitted to a lengthy series of processes, including perching, knotting, scouring, hydro-extracting, tentering, mending, milling, washing-off, gig-raising, boiling, cutting or cropping, pressing, brushing, and steaming. Of course cloths are not all passed through these processes, such fabrics as cheviots and tweeds requiring only simple and brief treatment in finishing; but in dressing a doeskin the whole routine has to be gone through.

Perching consists in making a close inspection of the piece with the object of marking all defects. *Knotting* is another manual process. As the smallest knot left in the piece may result in the fabric being torn or cut in the cropping operation, all such protrusions are carefully extracted by examining the underside first, so that the knots may be pulled out; and subsequently the face is treated, when the cloth is ready for *scouring*. The primary object here is to cleanse the piece, and the second to soften the threads and cause them to fill up the interstices existing between them when the cloth leaves the loom. If it were a mere question of scouring it could be readily attained by using strong detergents; but these would not only injure the handle of the fabric, but also affect its brightness of colouring. Scouring-machines are of two great classes—viz. those in which the pieces are twisted into a rope form during the operation, and 'open scourers,' in which the pieces are maintained in an expanded state. The latter are recommended when washing fabrics liable to crease and composed of fine yarns, but ordinary woollen goods are still largely scoured on the older system of having the pieces running through the machine in folds. To discharge the superfluous moisture the textures contain after scouring they are taken to either the wringer or, preferably, to the hydro-extractor (see DRYING-MACHINES). The latter expels the wet by centrifugal force, and, while imparting a lofty and kind feel to the cloth, does not in any way crease its surface as the wringer is apt to do. Defects not detected before the piece is washed are visible afterwards. These are repaired by the mender, who introduces threads or 'picks' where they are missing. Fine goods are difficult to treat in this respect.

The piece is now taken to the milling-machine (fig. 5). Here it is saturated with a solution of soap and then placed in the tank, A, and threaded through one of the divisions in the guide and knocking-off motion, B. Subsequently it runs over

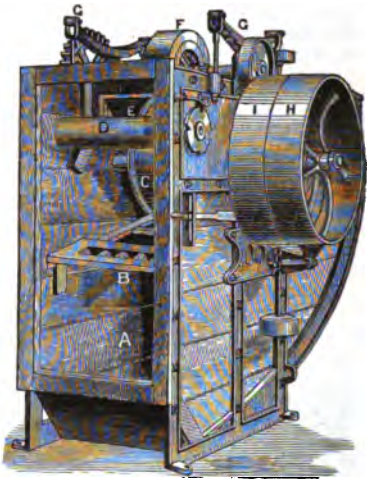

Fig. 5.—Felting, Fulling, or Milling Machine: A, tank; B, guide frame and knocking-off motion; C, flanged roller; D, guide roller; E, neck; F, top roller; G, G, springs; H, loose pulley; I, driving pulley.

a roller, D, and into the neck or throat, E, and from thence between two rollers, C and F. The lower one is flanged, the upper one fitting between its projection. Pressure is brought to bear on F by the springs, G, and in some cases by weights. As the piece passes between these rollers it is crushed and felted in the direction of the weft or transversely. Running now into an elongated box or the spout of the machine, it is cuttled up lengthways and therefore felted in the direction of the warp. Before the invention of the fulling-mill woollen goods were felted solely by stocks. These are still used, but for ordinary purposes have been supplanted by milling-machines. In the stocks the piece, after soaping, is placed in a trough and pounded by huge hammers or fallers. Goods thus felted possess in some instances a more substantial feel than when treated in the mill. Stock-fulling is a slow process, but is more natural than felting by the milling-machine, and is preferable where great fullness of texture is required.

Before milling, the individual threads in the cloth are quite separate, and by the aid of a powerful glass the scheme of crossing warp and weft may be traced; single threads can be removed without difficulty. But after milling, all traces of the threads as distinct factors have disappeared. Magnifying a sample scarcely makes them visible, for it is only by singeing the surface of a hard-felted woollen, and scraping away the floss and fibre, that the texture proper can be exposed and examined. Then it becomes apparent what changes have been wrought in its condition during felting; a porous fabric has been changed into one remarkable for its density, solidity, and firmness. Wool and hair are the only kinds of fibre that will felt, and the former is infinitely superior to the latter in this respect. Its physical formation, combined with the arrangement of the fibres in a 'carded' or woollen yarn, are at the basis of what takes place in the fulling mill or stocks when the fibres

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of individual threads mat, interlock, and dovetail into each other. The soapy condition of the piece, assisted by the heat generated in felting, accelerates this process. Saturated as the cloth is by the soapy compound, its filaments expand. The scaly circumference of one set of fibres is forced into that of an adjoining set, and thus by the pounding or pressure to which the piece is in the meantime submitted the yarns are brought closer together, until the threads literally form one mass of felted wool and lose their individuality. This kind of excessive milling is only applied to certain classes of army cloths, doeskins, pilots, beavers, and other heavy fabrics. After felting, the piece is washed off, hydro-extracted, dried, and then tentered or stretched on the tenter frame.

The processes of 'finishing' proper—viz. raising, cutting, brushing, and pressing—level and smooth the cloth, improve its appearance, develop the elements of the pattern, and add lustre and beauty of texture. *Raising* is generally performed on the gig, a huge cylinder mounted with teazles, the pliant and flexible teeth of which raise up the fibre on the face of the piece. There are two types of raising, *wet* and *dry*. Dry raising is practised in cloths where a clear smart face is required, such as tweeds, 'Saxonies,' and worsted coatings and trouserings. By 'getting up' the fibres and combing them out on the face of the texture it prepares the cloth for an effective and clear 'cut.' The *wet* process is adopted in finishing doeskins, moscows, meltons, and other heavy textures. It is the reverse in its effects to dry raising, aiming at preserving the fibre obtained in milling. Though it 'gets up' the filaments, it spreads or lays them on the texture, so that they give to the piece, after cutting, boiling, and pressing, a bright appearance.

Cropping or *cutting* was formerly a manual operation. Now it is performed on the 'perpetual,' a machine which in principle is identical with the lawn-mower. The surface of the cloth is evened and smartened in this process, the pile of fibres being levelled, and, if a 'fancy' texture, the style of the pattern is more prominently developed. After passing several times through the 'perpetual,' the piece is cuttled up in cardboard papers and placed in the press, heated by hot plates. It remains here till perfectly cool, when it is recuttled to take out the marks formed by folding, and again pressed. Solidity and lustre are acquired in this way, accompanied by a certain degree of harshness or unkindness of touch in the texture, which, however, may be readily removed by steaming, when the cloth is ready for the merchant.

WORSTED MANUFACTURE.—There is a difference in the appearance and characteristics of worsted and woollen fabrics, but this does not necessarily arise from the employment of dissimilar materials. It is quite feasible to employ the same class of wool in both manufactures; yet in the *worsted* the texture will be clear and bright, possessing a smartly-defined pattern, but in the *woollen* it will be covered with fibre, have a comparatively rough appearance, and its plan of construction be partially if not wholly concealed. 'Woollen' and 'worsted' as applied to these all-wool fabrics are somewhat ambiguous terms, as they signify neither the material used nor the scheme of yarn-making practised. Before the combing-machine was invented only long-stapled wools were made into worsted yarns; hence it became customary to define a woollen thread as the product of spinning short wool, and the worsted as the result of combing and spinning long wool. But now that all wools of whatever length are combable this definition is quite untenable. Next the worsted was designated a combed thread, to discriminate it from the woollen, which is a carded thread. These are more satisfactory distinctions, but are inapplicable to an important class of worsted yarns. For the worsted coating, trousering, and dress trades the wools employed are invariably prepared for spinning by gilling, combing, and drawing; but for the carpet branch of the weaving industry a worsted yarn is made in which the wool is not combed. The essential difference lies in one important element of procedure in working or preparing the wool for the final operation of spinning. When making a woollen thread the main object to be attained from the initial to the terminating stage of construction is to open, cross, and blend all descriptions of fibres in all possible ways—a routine which yields a yarn which possesses a rough fibrous surface (see fig. 6), and which when converted into a woven texture imparts a mellow and somewhat subdued effect to design and colour. On the other hand, in producing a worsted thread, the primary design is to place the fibres in parallel relationship with each other by in some cases extracting all curly filaments, and in all instances by as far as possible straightening and levelling them, so that a thread results which possesses a regular and well-defined circumference, and one which lends lustre to the fabric and precise development to almost every type of woven pattern.

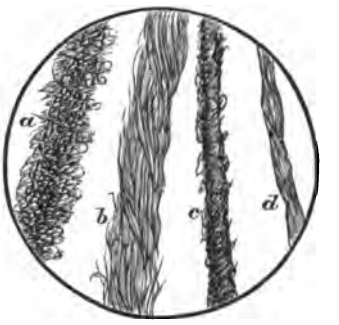

Fig. 6.

a, 30 skeins woollen yarn; *b*, twofold 30's worsted; *c*, 40's cotton; *d*, twofold 60's silk.

Fig. 6 illustrates the main features of dissimilarity between woollen and worsted yarns. Here *a* is the woollen or purely carded thread. At once it will be observed how variously intermingled its fibres are. Under the microscope the core of this yarn is practically a solid mass of filaments, twisting round which is a multitude of curly, wavy fibres of a diversity of lengths and diameters, that cross and intertwine with each other in literally every possible manner. In *b*, which is an enlarged drawing of a worsted thread, an altogether different system of amalgamating fibres in a yarn-like condition is evident. Now the filaments are perceptibly laid in the same plane, and form a somewhat regular thread.

There are three great systems of producing worsted yarns. First, when long wools are used, the material is gilled, combed, drawn, and spun. In the second system carding is added and precedes gilling; while in the third or carpet-yarn system the wool is carded, drawn, and spun. The special operations are those of gilling, combing, drawing, and spinning. Carding, though not precisely the same as in woollen yarn production, is similar in principle, and has been treated of above. Starting therefore with the material as it leaves the carder, previous to which it has been scoured and 'willeyed,' it is not condensed as in preparing for woollen-spinning, but is taken in 'laps' or bands, a few inches in width, and wrapped up into balls, to the backwashing-machine, where it passes through a trough containing 'scour,' and from thence over a number of drying cylinders to what is called the 'gill-box' part of the machine. Here it is engaged by a number of vertical pins fixed in iron bars, and called 'fallers,' which travel from

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one end of the box to the other on two pairs of endless screws, one placed above the other. The fallers only operate on the wool when moving on the upper screws. The wool is forcibly drawn through the pins of the fallers by a pair of rollers which have a higher velocity than the rollers which convey it into the box. 'Gilling' proper is a continuation of what occurs in this latter part of the backwasher. Each gill-box—some six boxes make a set—in which the work of gilling is accomplished possesses two pairs of rollers and a set of fallers. The receiving rollers move slower than the fallers, and the fallers in turn move slower than the delivering rollers. The result is that the wool is extenuated, its fibres are straightened and more or less laid in parallel conditions. The drawing-out process is termed the 'draft.' It takes place in every box, whose pins increase in fineness and number, so that the work becomes gradually more searching in character. Should the wool be examined at this stage it would be discovered that, while the longest fibres are comparatively straight, yet the short and curly ones in some instances literally traverse the ribbon, having escaped the action of the gill-pins of the fallers. By the combing-machine a classification of the fibres is made. The long and the straight are utilised in producing what is called the 'top' or combed wool, while the short, 'neppy,' and curly fibres are rejected, and constitute the noil. Combing also levels the wool.

Three distinct types of machines are employed in this work, known as the Noble, the Holden, and the Nip combs. Noble's machine consists of three circular combs, all of which revolve in the same direction, and are mounted in the interior of the framework of the machine. One of these combs has a diameter varying from 48 to 60 inches. It is called the large circle. Inside it are two smaller combs, with diameters of about 18 to 20 inches. They only work in conjunction with the principal circle at one point in their rotary movement. The ribbons of wool from gilling are brought and placed in the framework of the comb, each ribbon being passed through its own feed-box. The laps of wool are now pressed by what is called the 'dabbing' brush between the teeth of the comb of the large and small circles. Combing begins at this juncture, for each circle carries off in the teeth of its comb a quantity of fibres. As the angle between the combs increases the fibres are drawn out and straightened, the longest, which hang in the form of a fringe on the inside of the large comb and on the outside of the small one, being removed by 'drawing-off' rollers, and helping to make the 'top;' while the short and curly, which become imbedded between the teeth of each small comb, are extracted by knives set between the rows of pins of which such a comb consists. The extraction occurs each time the lesser combs revolve, so that it is impossible for the noil or unsuitable fibres to accumulate. All the combings, two from the large and one from each of the small circles, are collected together and passed into a funnel, when a degree of false twist is imparted as the combed 'top' escapes from the machine.

Levelling is performed by frequently drawing out or drafting and doubling the ribbons. Each compound process of drafting and doubling not only further straightens the wool, but yields a result that closer and closer approaches in appearance a spun thread. *Drawing* primarily produces a uniform ribbon, or one in which the several kinds of fibres are regularly distributed throughout its length; and secondly, it forms a slubbing of such fineness that on imparting twist, and further drafting, a spun and weavable thread will result. All drawing frames consist of two pairs of rollers, the 'deliverers' revolving at a higher speed than the 'receivers,' or the pair which bring the wool into the frame. As the ribbons are stretched between these rollers they are drawn out, or drafted. In a series of frames the amount of drawing and doubling to which the wool is submitted reaches the enormous number of fully five and a half millions of changes. On leaving the roving-frame, which may be regarded as the final 'drawing,' the thick thread acquired is ready for Spinning (q.v.). It is important to note that woollen and worsted yarn-spinning differ very materially from each other in principle. When making a woollen thread the sliver is passed direct from the rollers which grip it to the spindle. Moreover these rollers, after delivering a certain length, hold the sliver till extenuation has been effected and twist imparted. The roving in worsted spinning is differently operated upon. It passes between the back pair of rollers on to the front pair, being in the interval elongated. Escaping from these, it is twisted or spun, and wound on to the bobbin.

The yarn thus obtained is prepared for the loom by warping—grouping the requisite number and length of threads together in a systematic manner—by beaming or winding the warp on to the chain or yarn-beam of the loom, and by healding and sleying, processes which assign to the individual threads the positions they are to occupy and the part they are to play in the construction and embellishment of the fabric. After the loom (see WEAVING) has produced the texture, the piece is knotted, scoured, hydro-extracted, tentered, burled, cut, crabbed (wound tightly on to a perforated roller, through which steam is forced), pressed, and steamed (see *Woollen Cloth Manufactures* above).

Worsted manufacturing is now as important a branch of the textile industry as woollen manufacturing. Still the fancy section of it is only a recent growth. Up to 1870 worsted cloths were invariably piece-dyed, the attempts at using fancy yarns in these fabrics having been chiefly confined to the construction of figured and spotted vestings; but in that year the late Professor John Beaumont designed the first hank-dyed worsted yarn coatings and suitings. These were produced in Huddersfield, in which town the highest class worsteds for gentlemen's wear have for some time been manufactured. Bradford, on the other hand, is the home of the fine worsted dress and mantle trades, the productions of its looms competing in style and finish with those emanating from the textile establishments of Roubaix and other manufacturing towns of the north of France. But it must not be inferred from this that worsted-weaving is confined to a limited area in Britain. Leeds and the west of England possess numerous and important mills occupied in the production of combed-yarn fabrics, whilst even in some of the tweed-mills of Scotland small quantities of worsted suitings are made.

One drawback to the worsted texture is that it rapidly assumes in the made-up garment a shiny or glossy appearance, a defect that cannot be obviated without destroying other valuable and characteristic qualities which the fabric possesses. It is a natural sequence to the system of worsted yarn construction. A lustrous thread is aimed at, and to acquire this much of the natural curliness of the wool fibre is combed out, and a quantity of those short curly hairs which give fullness of touch and wearing power to the woven fabric are extracted. The result is a fabric that is liable to wear shiny, and one that is more porous in structure and less kind in the hand than the carded yarn production. For serviceability the worsted texture is not comparable with the woollen. Certainly it has its advantages. When new it is smarter than the woollen, and undoubtedly possesses a smoother and more attractive surface; but such qualities are

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ural construction, and fineness of fabric are required, worsted are the yarns *par excellence* for attaining these results; but if it is desirable to obtain a cloth distinguished by unique softness and elasticity of touch, mellowness of colour, and warmth and comfort in the wear, then it is necessary to employ threads constructed on the woollen principle of yarn manufacture.

The importance of the British trade in wool and wool manufactures may be gathered from the statistics of three selected years given at GREAT BRITAIN (Vol. V. p. 377), which show the imports and exports of wool and of woollen and worsted goods. In 1890 the total imports of wool into the United Kingdom were 633,028,131 lb., and of exports 340,712,303 lb.; so that 292,315,828 lb. were retained for home consumption. Of the total imports nearly 419 million pounds came from Australasia; probably 138 million pounds were produced at home. In the same year woollen and worsted piece goods to the amount of 261 million yards were exported, and 41 million pounds of yarn. In 1890 the value of woollen and worsted yarn exported was £4,086,000; of woollen cloths, coatings, &c., £6,016,000; of worsted coatings and stuffs, £10,360,000; of flannels, blanketings, &c., £1,097,000; of carpets and druggets, £1,115,000. In the same year the value of woollen yarn imported was £1,952,000, and of woollen manufactures £9,321,000. There were, in 1890, 1793 woollen and worsted mills in the United Kingdom. As has been mentioned at ENGLAND (Vol. IV. p. 347), the chief seats of the wool manufacture in England in the 14th century was Bristol, London, and Norwich. Now Wiltshire (q.v.) and Gloucestershire are famous for the finest broadcloths; the West Riding of Yorkshire is, however, the great seat of the woollen manufacture, Leeds and Huddersfield being very important centres. Galashiels and Hawick are noted for their tweeds.

In the United States the chief wool-manufacturing states are New Hampshire, Massachusetts, Rhode Island, New York, and Pennsylvania. The total value of the woollen goods produced in 1870 was over $151,000,000, of worsted goods $22,000,000; in 1880 the corresponding figures were $166,600,000 and $33,500,000. In 1890 the United States imported close on 103,000,000 lb., the principal countries from which it came being the Argentine Republic, Turkey in Asia, Australasia, the United Kingdom, Russia, and China. The yarn imported had a value of nearly $2,000,000; of cloths, $16,000,000; of women and children's dress goods, $24,200,000; of ready-made clothing, nearly $2,000,000. The exports are inconsiderable.

In 1860 Port Philip wool averaged 2s. and Lincoln hogs 1s. 10d. per lb.; in 1881 the super qualities of a combing class of the former wool sold for 2s. 10d., while the Lincoln had fallen to 1s. per lb.

See Bowman's *Structure of the Wool Fibre*, Beaumont's *Woollen and Worsted Cloth Manufacture*, Beaumont's *Woven Design*, M'Laren's *Woollen and Worsted Spinning*, and Alcan's *Traité du Travail de la Laine Cardée*. Also the articles SHEEP, CARPETS, FLANNEL, FELT, FRIEZE, SHAWLS, &c.

Woollett, WILLIAM (1735–85), engraver to George III. See ENGRAVING, Vol. IV. p. 380; and L. Fagan's *Catalogue Raisonné* of his 123 engraved works (1885).

Woolner, THOMAS, sculptor and poet, was born at Hadleigh in Suffolk, 17th December 1826, and was educated at private schools till he began his training as sculptor. 'Eleanor sucking the Poison from Prince Edward's Wound' (1863), 'The Death of Boadicea,' and 'Puck' attracted much 'The Rainbow.' He was closely associated with the Pre-Raphaelites, and contributed some poems to *The Germ*—poems which with others were published in a volume as *My Beautiful Lady* (5th ed. 1892). In 1862–64 he was in Australia; and on his return he rapidly rose to the front rank amongst English sculptors, grace and refinement being the notes of his work. Besides statues of Lord Bacon and William III., he executed statues or portrait busts of most of his famous contemporaries—Macaulay, Whewell, Palmerston, Cobden, Dickens, Kingsley, Carlyle, Darwin, Newman, Tennyson, Huxley, Gladstone, and many others. Other ideal works are 'Elaine,' 'Ophelia,' 'In Memoriam,' 'Virgil,' 'Guinevere,' 'Achilles and Pallas,' 'Lady Godiva Unrobing.' Made A.R.A. in 1871 and R.A. in 1874, he was professor of Sculpture to the Academy in 1877–79. Other poems were *Pygmalion*, *Silenus*, *Tiresias*, and *Nelly Dale*. He died 7th October 1892.

Woolsack, the name given to the seat of the Lord Chancellor of England in the House of Lords, whose essential portion is a large square bag of wool without either back or arms, and covered with red cloth, the whole forming a kind of cushioned ottoman, standing near the centre of the chamber. It is believed that woolsacks were placed in the House of Lords in the time of Edward III. to remind the peers of the importance of England's staple trade. An Act of Henry VIII. directs that the Lord Chancellor, Lord Treasurer, or other high officer shall sit and be placed at the uppermost part of the sacks in the said parliament chamber, either there to sit upon one form or upon the uppermost sack. D'Ewes says the Lord Keeper sat on the woolsack in 1559, when her majesty (Queen Elizabeth) was absent; the other woolsacks being as now allotted to the other judges. It 1621 it was declared in the standing orders of the House of Lords that 'the Lord Chancellor sitteth on the Woolsack as Speaker to the House'—i.e. not in his judicial capacity. See *Notes and Queries*, 4th series, vol. iii. p. 384.

Woolsey, THEODORE DWIGHT, was born at New York, 31st October 1801, graduated at Yale in 1820, and after studying in Europe was professor of Greek at Yale from 1831 to 1846, and then its president till 1871. In 1871–81 he was president of the American company of revisers of the New Testament. Besides editions of Greek plays, &c. his works include an *Introduction to the Study of International Law* (5th ed. 1879), *Essays on Divorce and Divorce Legislation* (1869), and *Political Science; or the State, theoretically and practically considered* (2 vols. 1877). He died 1st July 1889.

Woolsorter's Disease. See ANTHRAX.

Woolston, THOMAS, an ultra-heterodox and eccentric Deist, was born at Northampton in 1669, entered Sidney Sussex College, Cambridge, in 1685, became a fellow, and took orders. The study of Origen and his allegorical interpretation of the Scriptures seems to have turned his head, and in 1705 he published the *Old Apology for the Truth of the Christian Religion against the Jews and Gentiles revived*. Here Woolston maintained that Moses was only an allegorical personage, and all his history typical of that of Christ; that the miracles of the Pentateuch were allegorical, and the miracles attributed to Christ and the apostles pure allegory too; and he stigmatised as atheists and apostates all who received the Scripture narratives as literally, historically true. In subsequent publications he went further in the same direction; also maintaining that the Quakers approached more nearly in doctrine and organisation to the primitive church than any other religious body; and denouncing clergymen, because they made a profession of the

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pastorate, as 'hireling priests,' worshippers of the Beast, and ministers of Antichrist. In 1721 he published *The Moderator between the Infidel and the Apostate*, dialogues tending to show that the gospel miracles by themselves could not prove Christ to be the Messiah. This work occasioned great scandal, and it was only through the intervention of Whiston that the author escaped a prosecution. In 1721 his college deprived him of his fellowship. The views set forth in his last work Woolston developed more fully in *The Moderator between an Infidel and an Apostate* (1725), the former being Collins, the latter the modern Anglican clergy who had fallen away from the allegorical method of the Fathers and become priests of the letter. His famous series of six *Discourses on the Miracles of Christ* appeared from 1727 to 1729, with two *Defences* in 1729 and 1730. Here he maintained with much vulgar and offensive iteration that Christ's miracles in themselves were open to the gravest doubts; that in fact the gospel narratives, if they were to be taken literally, were only a tissue of absurdities; yet he loudly claimed to be a sincere Christian holding fast by the allegorical residuum of the miraculous history, and even Lechler takes him at his own valuation, but Trench, Strauss, and Cairns are more likely correct in counting this profession a mere blind. No less than sixty answers were made to the *Discourses;* but what was much worse, an indictment for blasphemy was brought against the writer. He was tried before Chief-justice Raymond at Guildhall, sentenced to be imprisoned for a year, to pay a fine of £100, and find securities to the amount of £2000 that he would not repeat his offence. He was imprisoned in the King's Bench, and the remainder of his life was spent within its rules. Here he died, 21st January 1731.

His works were collected in 1733 in 5 vols. with a Life. See Leslie Stephen's *History of English Thought in the 18th Century* (1880), and the works on Deism by Leland, Lechler, and Sayous.

Woolwich, a parish in Kent, and part of the royal manor of Eltham, on the river Thames, about 9 miles below London Bridge, was in 1885 constituted a parliamentary borough returning one member. The population of that borough in 1891 was 98,976, of whom 40,848 were in Woolwich itself (32,367 in 1851). The principal part of the town lies on the south bank of the river, but it has extended into Essex under the name of North Woolwich. A free steam ferry or floating bridge carrying vehicles connects the two portions. The town is chiefly important on account of the Royal Arsenal, employing some 12,000 men, whose wages exceed £72,000 a month. This establishment may be said to date from 1585, when Queen Elizabeth had a store of arms and armour at the Tower House, a mansion in Woolwich Warren adjoining the then boggy and unhealthy marshes of Plumstead. Prince Rupert protected the King's Warren with batteries in Charles II.'s reign, and other fortifications were added by that king's successor. The Dutch had several times threatened the dockyards here and at Chatham, and in 1695 two French privateers were captured off Woolwich. These fortifications have now disappeared. Towards the end of the 17th century the proof of ordnance was transferred from Moorfields to Woolwich, guns began to be cast there, carriages constructed, and powder stored. From these works grew the three great departments of the Royal Arsenal called respectively the Royal Gun Factories, Royal Carriage Department, and Royal Laboratory. But these names were not given until after the second visit to the Warren of George III. in 1805. The establishment then grew rapidly in importance. From 42 acres the ground covered by it extended to some 300. Guns of all sizes, every form of military wagon, shot, shell, torpedoes, cartridges, bullets, war, signal, and life-saving rockets, tubes, and fuzes have since always been produced there, small-arms being made at Birmingham and Enfield, in Essex, and powder, gun-cotton, and other explosives at Waltham in the same county. The wharves were enlarged by convict labour. A canal first and then lines of railway were constructed, together with piers and powerful steam and hydraulic cranes. Extensive practice ranges also were added in the Plumstead marshes, which had been carefully drained and embanked against the river. Machinery of the best and most modern type fills the workshops, and immense quantities of all kinds of warlike stores are collected, ready for issue to either the army or navy of the empire. As this establishment is the only government gun-factory, its importance cannot be overrated.

The garrison of Woolwich consists of a major-general commanding with his staff, the headquarters of the Royal Regiment of Artillery, of the Ordnance Store Corps, and of the Army Service Corps; some thirteen batteries of artillery, one infantry battalion, a strong body of Volunteer Artillery, and a battalion of Rifle Volunteers, together with a considerable number of men of the various departmental corps. The barracks occupied by the troops are very imposing buildings. The Herbert Hospital, built soon after the Crimean war at the south end of Woolwich Common, is one of the largest military hospitals in Great Britain. The common itself, nearly half a square mile in extent, forms an excellent drill-ground. At its south-west corner there is a hut camp for two field batteries, and opposite to it the handsome buildings of the Royal Military Academy. This, the oldest military school in the kingdom, dates from 1741, when forty cadets were quartered in the arsenal for training in artillery and engineer duties. In 1806 the building on the common was occupied by some 150 cadets, a number which increased at one time to as many as 280. All are destined for the Royal Artillery or Royal Engineers. Another military educational establishment at Woolwich is the Artillery College, for giving special training to officers of the Royal Artillery, in order to fit them for appointments in the manufacturing departments of the Royal Arsenal, &c. It is located in the red barracks, built originally as a hospital for the marines, one division of which corps was quartered at Woolwich until 1869. In this year the Royal Dockyard at Woolwich was closed, as it was found unsuitable for modern ships of war, but it continues to be used as a military store depôt. It was the first and for long the principal dockyard in the kingdom. The *Great Harry* was built there in 1562, the *Royal George* in 1751, the *Galatea* in 1859, and more than 200 other ships.

At the north-west end of the common is the Repository, enclosed with a breast-work, and containing drill-sheds and materials for shifting heavy guns, building military bridges, &c., and the Rotunda Museum of military antiquities and models. Part of the Repository enclosure is laid out as a pleasure-ground. Close to the Rotunda is a small observatory belonging to the Royal Artillery Institution, which is itself part of the artillery barracks, and contains a natural history museum, a valuable library, many military relics, and a lecture hall for the discussion of papers on military subjects. St George's Garrison Church, near the artillery barracks, opened in 1863, is one of the most conspicuous buildings in the town. Few of the others are important. Woolwich, whose greatest son was General Gordon, has gradually become a suburb of London, and is connected with it by a railway and tramway. Plumstead on the east and

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it they are densely populated, and may be considered part of London. See ARTILLERY, CANNON, FUZE, MILITARY SCHOOLS, ROCKET, SHELL, &c.

Woonsocket, a town of Rhode Island, on both sides of the Blackstone River, 38 miles by rail SW. of Boston, with manufactures of iron, rubber, and especially cottons and woollens. Pop. (1880) 16,050; (1890) 20,830.

Woorali. See CURARI.

Wooster, capital of Wayne county, Ohio, on Killbuck Creek, 135 miles by rail W. by N. of Pittsburgh, is the seat of a Presbyterian university (1866). Pop. (1890) 5901.

Worcester, the county town of Worcestershire, 27½ miles by rail SW. of Birmingham, 65½ NNE. of Bristol, and 121 (by road 111) WNW. of London. It stands on the left bank of the Severn, here crossed by a five-arch stone bridge (1781–1841), 270 feet long. Previously perhaps a station of the Romans, *Wigornaceaster* became in 679 the seat of a Mercian bishopric, whose cathedral is Worcester's chief glory. It is a double cross in plan, 410 feet long, 126 wide across the west transept, and 60 to 67 high, with a central tower of 196 feet. Rebuilt from 1084 onwards, and restored since 1857 at a cost of £100,000, it is mainly Early English and Decorated in style, but retains a very interesting Norman crypt, and has Perpendicular features. The simplicity, if not plainness, of the exterior is amply compensated by the fine perspective of the lofty groined roof, and the general noble effect of the interior. One may specially notice the columns of Purbeck marble, the 14th-century choir-stalls and misereres, the elaborate modern reredos, the circular chapter-house, the splendid peal of twelve bells, and the tombs of King John, Prince Arthur, Lord Lyttelton, the Earl of Dudley, and (in the cloisters) 'Miserrimus,' a not very wretched Nonjuror. At Worcester, alternately with Hereford and Gloucester, are held the festivals of the 'Three Choirs.' The old episcopal palace is now the deanery, the present palace since 1842 being Hartlebury Castle, 11 miles N.; and the cathedral school (1541) occupies the superb 13th-century refectory of a Benedictine priory. There is also Queen Elizabeth's school (1561). Nothing remains of the castle, and the Guesten Hall was ruthlessly pulled down in 1860; but there are a fine hall called the Commandery, a gatehouse ('Edgar's Tower'), and a good many old timbered houses, while of public buildings may be noticed the guildhall (1723), the shire-hall (1835), and the museum and free library (1836–79). Worcester is the seat of such well-known industrial establishments as the Royal Porcelain Works, dating from 1751, and covering 5 acres, the glove-manufactory of Messrs Dent (a Glovers' Company was incorporated in 1497), and the 'Worcester Sauce' factory of Lea & Perrins; besides huge vinegar-works, great nurseries, and manufactories of railway signals, chemicals, &c. In the neighbourhood are hop-yards. Worcester is a municipal borough, chartered by Richard I. in 1189; a parliamentary borough, returning only one member since 1885; and also, since 1888, a county borough. Pop. (1851) 27,528; (1881) 38,270; (1891) 42,905. Worcester was the scene of numberless sieges from the time of the Danes down to the 'crowning mercy' of Cromwell, when, on 3d September 1651, he routed Charles II., killing 4000 and making 7000 prisoners. Charles afterwards commemorated the loyalty of the citizens by granting them the motto of 'Civitas fidelis.' Natives have been the alchemist Kelly, Lord Somers, and Mrs Henry Wood; whilst among the eighty and more bishops have been St Dunstan, St Oswald

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Worcester, JOSEPH EMERSON, lexicographer, was born at Bedford, New Hampshire, August 24, 1784. Although employed in youth in agricultural labour, he gave himself a liberal education, entered Yale College in 1809, and graduated in 1811. For some years a teacher at Salem, Massachusetts, he gave his life thereafter to continued literary labours down to its close at Cambridge, Massachusetts, October 27, 1865. All his works were laborious, but most of them unhappily ephemeral: gazetteers, manuals of geography and history, the *American Almanac* (1832–43). He prepared an edition of Chalmers' abridgment of Todd's Johnson's Dictionary, together with Walker's Pronouncing Dictionary (1828), abridged Webster (1829), and printed his sound and sensible *Comprehensive Pronouncing and Explanatory English Dictionary* (1830; enlarged ed. 1855). His *Universal and Critical Dictionary* followed in 1846; his great quarto *Dictionary of the English Language* in 1860.

Worcestershire is an inland English county of very irregular outline, bounded on the N. by Shropshire and Staffordshire, E. by Warwickshire and Oxfordshire, S. by Gloucestershire, and W. by Herefordshire and Shropshire. Its extreme northern and southern length is 50 miles, and its greatest breadth, east to west, 26 miles; but from the irregularity of its borders its area is but 738 sq. m., or 472,453 acres. Pop. (1801) 146,445; (1851) 276,926; (1881) 380,283; (1891) 413,753. The Severn is the chief river, and is navigable throughout the county from Bewdley to Tewkesbury, passing by the city of Worcester. The Warwickshire or Upper Avon, which enters Worcestershire near Cleeve, and passes by Evesham and Pershore, falling into the Severn at Tewkesbury, is also navigable. The other rivers of the county are mostly feeders of these two—the Stour, the Salwarp, and the Teme of the Severn, and the Arrow of the Avon. A small portion of the north-east corner of the shire lies in the basin of the Trent. The canals were of great importance before the development of the railway system, the Stourport uniting the Trent and Severn navigations, and the Worcester and Birmingham leaving the Severn at Diglis, and connecting at Birmingham with the general canal system. The local railways are those of the Midland and Great Western systems. The surface of the shire is diversified and picturesque, with many landscapes of great beauty. The chief hill range is that of the Malverns, on the border next Hereford; the Cotswolds stretch between Worcester and Gloucester; the Clents command part of the Warwick and Stafford frontier, chiefly of the 'Black Country;' the Lickey range is more central. The Clee Hills lie well to the north-west in Shropshire, but high broken ground stretches thence to the verge of Worcestershire in the romantic forest of Wyre. It is to the constant presence of one or other of these bold upland regions that the valleys of the Severn and the Avon owe that singular combination of sylvan and pastoral beauties which makes the landscapes of the county typical of some of the most characteristic and attractive phases of English scenery. The geology of Worcestershire is varied and interesting. Triassic rocks occupy most of the central region, with the Lias and Oolite of the Cotswolds on the south, and on the north Permian, Carboniferous, and Devonian. In the upland to which the Clent and Lickey Hills belong Silurian and Archæan rocks occur, and in the Malvern range Silurian, Cambrian, and Archæan. Taken in connection also with their igneous features, the Malvern Hills are almost unsurpassed for geological interest in the kingdom. The Rowley Rag basalt in the north-east corner of the county is noteworthy. The Silurian strata of Dudley are highly fossiliferous, and there are a number of good fossil localities in the Malverns and near—chiefly Silurian and Devonian. The mineral wealth of Worcestershire has had chief influence on its more recent history. As a whole it is a highly fertile agricultural region, with upland sheep-walks, productive tillage ground, and a very extensive fruit-growing area. Plums, pears, and apples are grown in enormous quantities, the neighbourhood of Pershore being the chief plum-growing centre in the kingdom, while the apples and pears are largely used in the manufacture of cider and perry. The more northern districts are, however, chiefly engaged in manufacture. Salt has been raised from the brine-springs at Droitwich (fed by immense beds of rock-salt in the Trias) certainly for more than 1000 years. The manufacture of iron, carried on by the Romans, has developed into the busy industries of the unlovely 'Black Country,' of which Dudley, with iron-mines and collieries, is the chief centre. Special branches of iron and steel industries are represented by the chain manufacture at Cradley and Netherton; nail-making at Halesowen and Bromsgrove, with edge-tools and smaller wares; while Redditch and Feckenham make needles and fish-hooks, and Brierley Hill turns out immense quantities of the coarser hardwares. Other developments of local mineral resources are seen in the fireclay goods of Stourbridge, and the glass wares produced there and at Stourport. The famous porcelain-works of Worcester have not the same immediate local connection. In the middle ages a great deal of cloth was made, which may now be regarded as represented by the carpet-weaving of Kidderminster; and there is another important local industry in the gloving of Worcester city.

Little is known of the early history of the county, but the Romans seated themselves at Worcester as a frontier town when they defeated the Silures. In Saxon days it first fell into the hands of the Hwicci, and then became part of Mercia. The shire chiefly finds place in the national life in connection with its city; but three of the great decisive battles of English history were fought wholly or in part upon its soil. At Evesham, August 4, 1265, Simon de Montfort was defeated and slain; at Tewkesbury, May 4, 1471, the Lancastrians under Margaret suffered their sorest defeat; at Worcester, September 3, 1651, Cromwell gained his 'crowning mercy.' Some of the most active participators in the Gunpowder Plot were associated with Worcestershire (see SECRET CHAMBERS). Antiquities of the older type are not numerous; still there are some fine earthworks, and those on the Herefordshire Beacon, the highest point but one of the Malverns, are among the finest in England. (This hill is 1370 feet high; the Worcestershire Beacon, the highest point in the county, 1440 feet.) The architectural antiquities of the county are chiefly ecclesiastical. There is remarkably fine Early English work in the cathedral, with a very noteworthy Norman crypt, and much that is interesting in the remains of the religious houses, as at Malvern, Pershore, and Evesham. There are many half-timbered dwellings, some of great merit. The changes in the civil organisation of the county have not been great. Before 1832 the shire had nine members; Dudley and Kidderminster were then enfranchised, and the total increased to twelve; at present there are eight, one each for five county divisions, and for Worcester, Dudley, and Kidderminster. Worcester and Dudley are county boroughs, and the other municipalities are Bewdley, Droitwich, Evesham, and Kidderminster. Of Worcestershire worthies may be mentioned Sir Thomas Littleton, Bishop Bonner, Samuel Butler,

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Lyttelton, S. Foote, Warren Hastings, W. Huskisson, and Sir Rowland Hill.

See works by T. R. Nash (2 vols. 1781–99), J. Chambers (worthies, 1820), Sir C. Hastings (nat. hist. 1834), G. E. Roberts (geology, 1860), Lees (botany, 1867), J. Noake (1868 and 1877), W. Niven (old houses, 1873), and the present writer, R. N. Worth (1889).

Worde, WYNKYN DE, pupil and successor of Caxton (q.v.), was most probably a native of Worth in Belgium. It is not known when he entered Caxton's service, but most likely it was at a very early age, as he was still living in 1535. In 1491 he succeeded to the stock-in-trade of his deceased master, but he did not append his name to his books till 1493. From about 1502 onwards he worked in Fleet Street at the sign of the Sun. He used on his books many varieties of Caxton's 'mark,' and Mr Blades gives as many as fourteen variant forms of his own name. Wynkyn de Worde made great improvements in the art of printing, and especially in that of type-cutting. But it was more likely Pynson than he that first introduced Roman letters into England, using them as we now use italics. The books printed by him—408 in number, according to the list in Dibdin's edition (1810) of Joseph Ames's *Typographical Antiquities*—are generally distinguished by their neatness and elegance, hardly by their accuracy, nor, a few excepted, by the literary value of their contents.

Wordsworth, WILLIAM: 1770–1850. Descended from an old north-country stock, dwelling in Yorkshire and Westmorland, Wordsworth was born 7th April 1770 at Cockermouth, on the Derwent, 'fairest of all rivers,' within sight of the mountains among which were to be his home his happiness and his grave. There and at Penrith, (where Mary Hutchinson, his beloved wife to be, was his schoolmate), the child's first years went by, perhaps with little control, for his parents died early: stiff, moody, and violent in temper as he describes himself; the tough, stern dalesman's nature which, softened and elevated, passed into the strong truthful self-dependence, the high invincible moral courage, the plainness of phrase which often rendered him misunderstood in later life. Sent to school (1778) at Hawkshead, a singularly picturesque village over Esthwaite Lake, he enjoyed healthy freedom, not, we may believe, without 'the silent thoughts that search for stedfast light,' both in studies and sports: exchanged, (1787–91), for far less congenial days at St John's, Cambridge. Here he read widely without plan or academic purpose, yet meditating much, and with a vague but firm hope that his life would leave some achievement 'which pure hearts should reverence.'

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In 1790 Wordsworth visited France and Switzerland: France again in 1791–92. Journeys in fact, with him as with Tennyson, were the most salient events in the poet's quiet outward career. But Wordsworth's two visits to France, besides supplying him with a crowd of motives for song, proved the great determining experience of his life, though in a bent opposite to that which they then seemed to give. The France of 1790, in the genial stage of intoxication with the first draughts of liberty, the 'sublime senselessness of joy,' filled him with enthusiasm: and even the excesses of 1792, (when he barely escaped death in that fatal September), left his republicanism dominant. But the spell of that Masque of Anarchy, soon exchanged for tyranny by invariable sequence, gradually and sadly passed: he recognised that nations must 'stand on the ancient ways' if they are to advance safely; by process of the 'years that bring the liberty for that of the true.' In Dean Church's fine phrase, the trial and the struggle he went through 'annealed his mind to its highest temper.' And henceforth a passionate devotion to England, felt 'as a lover or a child,' and deep as Shakespeare's or Tennyson's, possessed him:

> Ah! not for emerald fields alone,
> With ambient streams more pure and bright
> Than fabled Cytherea's zone
> Glittering before the Thunderer's sight,
> Is to my heart of hearts endeared
> The ground where we were born and reared!

Two poems in 'heroic' metre were Wordsworth's first step towards publicity (1793): the *Evening Walk* and *Descriptive Sketches*, written 1787–92; the latter reflecting his Swiss and earlier French experiences. 'Seldom, if ever,' Coleridge wrote (1817) 'was the emergence of an original poetic genius more evidently announced.' But this and the next two years, whilst the darkness gathered deeper over France, were a time of restlessness and misery to Wordsworth: he was passing through the throes of personal poverty, of mental disillusion and renaissance. In 1795 Calvert, a young friend, left him £900, a sum which to Wordsworth was competence. Encouraged thus, and by the presence of his loved and gifted sister Dorothy, 'sister of his soul,' he now consciously 'found himself,' taking poetry alone as 'his office upon earth.' Settling at Racedown near Crewkerne (1796), Wordsworth first saw the great Coleridge, another critical moment in his poetic development: moving, (1797), for Coleridge's neighbourhood, to Alfoxden by the Quantocks. That beautiful district, and a tour by the Wye, bore fruit in his *Lyrical Ballads* (1798): republished, with a second volume (1800). After some months in North Germany, he moved to the fair region he was so splendidly to make his own, settling first (1799) at Grasmere.

These happy fertile years (1798–1808) were crowned with happiness by marriage, a perfect marriage, (1802), with Mary Hutchinson, known from childhood: another of the striking parallels between Wordsworth and Tennyson. In 1805 he finished the autobiographical *Prelude*, deferred for publication during his lifetime: 1807 gave us two fresh volumes, recording many experiences of life, many of his most memorable poems:—of which, hereafter. Some of his most perfect work was then due also to the Scotch journey of 1803 in his sister's inspiring company.

Few events remain for notice. 1814 and 1832 saw more visits to Scotland; the last noteworthy as the farewell to Walter Scott. Though working on very different lines, respect and love united these two great writers: and we may here name among Wordsworth's friends Coleridge, Lamb, Southey, Rogers, Sir George Beaumont, Lord Lowther, his own brothers, (John, to his great grief, drowned 1805); with several noble-natured and gifted ladies. Many he overlived: but the loss which, though wounding him most, he met with perfect resignation, was the death of his daughter Dora (1847). In 1814, (to conclude our brief bibliography), appeared *The Excursion:* 1815, the *White Doe:* 1819 and 1820 the *Duddon* sonnets and other pieces. 1820 and 1837 mark visits to Italy, deeply enjoyed and utilised in verse, 1822, 1842: in 1835 came *Yarrow Revisited* and *Sonnets to Liberty and Order.*

Some popularity, long deferred, some honours, meanwhile awaited the poet whose career, (to take a figure from Coleridge), had so far outstripped his critics that he seemed dwarfed in their eyes. In 1839 Oxford, amidst deep applause, gave him the Doctorate. Most precious, however, in Words-

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received from Keble; a poet of whose first work he spoke 'with love and delight,' whilst characteristically and justly dwelling upon its inaccuracy or want of finish in diction: 'I like the volume so much, that, if I was the author, I think I should never rest till I had nearly rewritten it.'—Here let us quote a few of Wordsworth's recorded remarks upon some of his brethren in art. Speaking of his admiration for Chaucer, he adds his profound reverence 'for him as an instrument in the hands of Providence for spreading the light of literature through his native land.' 'I admire Dryden's talents and genius highly, but his is not a poetical genius.' 'Milton was an aristocrat in the truest sense of the word.' His blank verse, like Tennyson, he held was framed from the Vergilian hexameter; *Paradise Regained*, 'the most perfect in *execution* of anything by Milton: that and the *Merchant of Venice*, in language almost faultless.' 'Ariosto is not always sincere, Spenser always so.' Two remarks on Goethe go deep: 'He had not sufficiently clear moral perceptions to make him anything but an artificial writer;' and that one recorded and endorsed by Matthew Arnold, 'Goethe's poetry was not *inevitable* enough.' If Coleridge had not, in Germany, received the bent to 'metaphysical theology, he would have been the greatest, the most abiding poet of his age.' Profoundly as Wordsworth was impressed and influenced in style by Burns, he candidly notes that the *Scots wha hae* 'is poor as a lyric.' 'I don't like to say all this: but, as a poet, Scott *cannot* live, for he has never in verse written anything addressed to the immortal part of man.' He notices (1827) the faultiness of Byron's language; adding 'Shelley is one of the best *artists* of us all: I mean in workmanship of style.' 'Horace is my great favourite, I love him dearly.' 'First read the ancient classical authors, *then* come to *us;* and you will be able to judge for yourself which of us is worth reading.' 'Very few books,' let us here add from De Quincey, 'sufficed him; he was careless habitually of all the current literature, or indeed of any literature that could not be considered as enshrining the very ideal, capital, and elementary grandeur of the human intellect.'

Lastly, to connect Wordsworth with our own day, he writes (July 1, 1845), 'I saw Tennyson when I was [lately] in London, several times. He is decidedly the first of our living poets, and I hope will live to give the world still better things.'

1843, on Southey's death, brought Wordsworth the Laureateship, an office raised in dignity by 'him that utter'd nothing base:'—words which England now recognises as no less true of his illustrious successor. A singular and almost unbroken felicity, seldom perhaps so well deserved, attended the last half of Wordsworth's life. 'What he gave to others, and what he most desired for himself,' says a friend, 'was love.' He felt for his friends and family, neighbours and dependents, for children, for the poor, that intense tenderness which his poetry expresses towards what, by a narrow phrase, we call Nature: till, with such Euthanasia as human life allows, 'old, yet unchill'd by age,' on April 23, 1850, the great soul made his calm and Christian transit to the spiritual world on which his thoughts had been long devoutly fixed. He had overlived the chilling want of sympathy which original genius never fails to arouse among commonplace minds; he had outlived the mis-estimation of some nobler spirits, and the overpartiality of undiscriminating worshippers; his work for his countrymen, wherever scattered over the world, was at length fairly judged, and found to rank in quality with the best to which England has given birth; and he now rests from among neighbours and kinsmen, within the bosom of the hills he loved so heartily, and the Rotha running at his feet with a music not sweeter than his own.

Turning from the Man to the Poet: In our limited space we propose now to set forth Wordsworth's own views upon his art, and his aims: his chief characteristics: certain fallacies current regarding his work: with some notice of the poems as they mark the stages of his life and art. And we shall here rely greatly upon the criticisms which in the maturity of his and his friend's powers, Coleridge published in his *Biographia Literaria*, 1817.

To the second issue of his *Lyrical Ballads* (1800) Wordsworth added a Preface with an Appendix, the study of which, and of a somewhat later Essay, combined with Coleridge's analysis, we venture to press upon all readers who love Poetry wisely, as forming (despite certain doubtful propositions), the best suggestive outline of an Art of Poetry known to the writer. (Aristotle's treatise has reached us in a state too imperfect, and is too exclusively Hellenic in its range to be here in question.) Yet in the forefront of the Preface, Wordsworth laid himself fairly open to hostile criticism by bringing forward as the guiding principle of his poetry a too dogmatic insistence upon 'incidents and situations from common life, tracing in them . . . the primary laws of our nature,' to be related or described 'throughout, as far as was possible, in a selection of language really used by men.' The persons were 'generally' chosen from the labouring ranks, because 'our elementary feelings' are amongst them most simply shown, are capable of most forcible representation, and are 'incorporated with the beautiful and permanent forms of nature.' Hence also the language of these men, somewhat 'purified,' was used; being, from natural circumstances, simpler and truer: 'a more permanent, and far more philosophical language than that which is frequently substituted for it by the poets:' and he argues further that between the language of prose and poetry, (metre excepted), no definite barrier lies; 'poetic diction,' (probably with special reference to 18th-century writers), being carefully excluded from the poems before us.

This theory, as exemplified in the *Ballads*, raised a storm and shout of derision from the critics of the day, which long impeded Wordsworth's popular reception. And doubtless, although phrases occur which really limit the main argument, yet as Coleridge showed in his masterly analysis, Wordsworth assumed, 'in terms at once too large and too exclusive, his predilection for a style the most remote possible from the false and showy splendour which he wished to explode;' seeming, at first sight, to confine truth and simplicity of feeling and language to 'unsophisticated' man, and the incidents hence chosen: he overstated both the poetic possibilities of the speech of common life, and the importance of the conventional diction of the day.

Yet both in his own age and since critics exaggerated Wordsworth's positions. His final claim is only that by following his method, genuine poetry of permanent interest and moral value would be produced. And in fact it is but a small proportion of his poems, and those of early date, which are any way thus injured in effect. The general theory of poetical art fills most of the essays; and herein lies their great and lasting value. Pleasure, immediate, pure, durable, exquisite, but not exclusive of painful scenes, he lays down and brilliantly vindicates as always essential to Poetry; 'excitement in co-existence with an overbalance of pleasure:' whilst the worthiest objects of the art

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are 'the external universe, the moral and religious sentiments of Man, his natural affections, and his acquired passions.' Thus Poetry to Wordsworth is 'the breath and finer spirit of all knowledge:' man and his environment are essentially adapted to each other; there is a kind of interplay between him and nature. Hence, in strict accordance with the common voice of the great poets of all ages, he says of himself 'I wish always to be considered as a teacher, or as nothing:' or, as he expressed it, his purpose was 'to console the afflicted; to add sunshine to daylight, by making the happy happier; to teach the young and the gracious of every age to see, to think and feel, and therefore to become more actively and securely virtuous: this is their office.'

This constant dealing with life, as Arnold has remarked, this 'energetic and profound treatment of moral ideas, is what distinguishes the English poetry,' and eminently that of Wordsworth. Yet in art, as in human life, narrow is the way to excellence. *Surgit amari aliquid:* even with the most poetical poet, the high lesson tends to become dominant over beauty; the moral supersedes pleasure. Wordsworth, to notice here his defects, has hence much that is simply didactic: his intense imaginative gift, his vivid sense of unity, saved him from the prosaic: the lion's grasp is hardly ever wanting: yet a certain heaviness often alloys his longer poems, whether those of meditative reasoning or of narration. In simple metres he has stateliness, he has exquisite sweetness: but he cannot compete with the effortless variety, the ethereal grace of Shelley's short lyrics; with Keats in the splendid wealth, the magnificent music of his odes. Not only is his style curiously unequal, but he had no consciousness of lapse: was at times diffuse and overminute in details: in common with almost every modern European poet, he wrote too liberally. He has images too lofty for the subject: 'not always graceful in the play of fancy,' says Coleridge: and especially in some early lyrics, is bald and even clumsy.

Yet some of these defects are near akin to great merits: and the mass of work equally admirable in art and precious in substance, which Wordsworth's eighty years have left us, distinctly places him, (if I may express my entire concurrence with Arnold's judgment), next, in sequence of time, to Milton. Other poets of his period may have been equally gifted; but he was allowed to gather in his whole harvest. Specially we may note his austere, logical, accurate purity and noble plainness in diction, 'impassioned, lofty, and sustained:' with the corresponding 'weight and sanity of the sentiments,' won not from books but fresh from the soul: frequent ingenious happiness of phrase, the *curiosa felicitas* of his favourite Horace: perfect truth, perfect modesty of painting, in his descriptions and images from nature:—so keenly noted and so numerous that, as Tennyson once remarked, 'he always seems to have been before one in observation.' Rising now to the inner spirit of the work, Wordsworth eminently was a merciful judge of his fellow-creatures, with the deepest inborn feeling for the poor, always tender to the ignorant and the erring, grieving 'for the overthrow of the soul's beauty.' Hence he abounds in 'a meditative pathos, a union of deep and subtle thought with sensibility; a sympathy with man as man. Such he *is*, and so he writes,' said Coleridge: who then challenges pre-eminently for him 'the gift of Imagination in the highest and strictest sense of the word.' In this 'he stands nearest of all modern writers to Shakespeare and Milton, and yet in a kind perfectly unborrowed and his own.'

On this singular imaginative power a few words must be added. As a child, Wordsworth's vivid mind unconsciously reproduced the famous ideal philosophy of Berkeley. 'I was often unable,' he writes, 'to think of external things as having external existence, and I communed with all that I saw as something not apart from but inherent in, my own immaterial nature. Many times while going to school have I grasped at a wall or a tree to recall myself from this abyss of idealism to the reality:'—And, shadowy and transient as these strange influences of the childish imagination necessarily were, they lay at the root of that peculiarly spiritual tone with which Wordsworth always looked on the world. When this 'visionary gleam' passed from the yet unconscious poet's eyes, the same imaginative faculty, taking a new but analogous form, presented the world to him as itself actually interfused with living power:

> He felt the sentiment of Being spread,
> O'er all that moves and all that seemeth still;—
> The presences of Nature in the sky
> And on the earth; the Visions of the hills,
> And Souls of lonely places.

Or again, when as a boy he was bird-chasing,

> —moon and stars
> Were shining o'er my head. I was alone,
> And seemed to be a trouble to the peace
> That dwelt among them.

Or once more, with profounder force still, we find him unhesitatingly speaking of

> The Being that is in the clouds and air,
> That is in the green leaves among the groves:—

The Omnipresence of God was surely never more deeply felt, or expressed more deeply.

This brief attempt to catalogue the gifts of exceptional genius is inevitably tentative; but Wordsworth has himself set forth his poetical aim in verse and prose: and high as the aim was, it is not too much to say that he came near as human limitations allow toward accomplishing it. Great force in thought, great power of imagination,—these, by natural law, are the primary elements whence all great poetry has sprung. The fountain of verse can never rise to a higher height,—can indeed never absolutely equal the height,—of the well-head of the poet's own nature. The workman is ever greater than the work. But those two capital gifts, like the elements of chemistry, are combined in various proportions to form the substance of the song: and in Wordsworth's case their union indubitably places him amongst the most spiritual, the most ideal, in the noble army of singers. Very unequal is his poetry; yet, everywhere, as if by natural necessity, even the lowliest themes are lifted to their loftiest meaning. It was his function 'to breath Grandeur upon the very humblest face Of human life:'—

> The light that never was on sea or land,
> The consecration, and the Poet's dream,

in their degree, are constantly present.

This nobly meditative mood at once elevates and limits his range. 'Of all poets,' says Dean Church, 'Wordsworth made himself most avowedly the subject of his own thinking.' In the great partition between Objective and Subjective, he counts among the latter. Yet herein we find one of his most conspicuous and delightful characteristics. His subjectivity is itself objective. Speaking for himself, Wordsworth will be found to speak for all of us: it is the common human mind which he perpetually interprets. As if they had never been thought before, he gives back our own thoughts with an exquisiteness and a distinctness all his own:

> I've heard of hearts unkind, kind deeds
> With coldness still returning;
> Alas! the gratitude of men
> Hath oftener left me mourning.

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Lines like these or descriptions of the same quality occur perpetually, and once read, are unforgettable.

If it be a vulgar error that ascribes egoism to Wordsworth's lofty meditative independence, no less is it palpably incorrect to hold him pre-eminently the poet of Nature. The wealth of his landscape, whether in fine details or in larger pictures, (closely analogous to the work of his great contemporary, W. M. Turner), is indeed inexhaustible; the delicate accuracy, the 'eye always upon the object,' never absent; and he is ever mindful that the 'forms Of Nature have a passion in themselves, that intermingles with those works of man To which she summons him.' Yet men, 'as they are men within themselves,' are his true theme: heroes and sufferers in lowly life; great characters of all ages; actors in the stormy scenes of war and politics during his youth. 'There is,' as he wrote of his poems, 'scarcely one which does not aim to direct the attention to some moral sentiment, or to some general principle, or law of thought or of our intellectual constitution.' 'He deals with life,' as Arnold puts it; 'and his greatness lies in his dealing with it so powerfully.'

Another, and at first sight a more tenable, error is that Wordsworth's later poetry falls greatly below the earlier: a common narrowness of human judgment from which Scott and other great writers have suffered. The undeniably fuller freshness of his first maturity, which is strongly marked in Wordsworth, seems to have blinded readers to the larger aim, the deeper sentiment, the sweeter truth, of work, perhaps less complete in art, less decorated, whilst essentially loftier. The Sublime, in a word, can never gain the popularity of the Beautiful.

It remains to complete, so far as possible, this imperfect sketch by a rapid view of the poetry itself in its main aspects. Four such may be noted.

I. The two early descriptive poems, in some degree, by diction and metre, remind us that they belong to the 18th century. Their style, as Coleridge observed, is powerful, but at times knotty and contorted; the images crowded to obscurity. Yet splendid lines occur, as when he represents the soul holding 'communion high' with God,

> There, where the peal of swelling torrents fills
> The sky-roofed temple of the eternal hills.

The *Guilt and Sorrow*, (1793–94), in its gloom recalls that darkened period of Wordsworth's life: but in the *Nay, Traveller*, (1795), we see already his exquisite inimitable touch in painting character and landscape. Wordsworth's single tragedy, *The Borderers*, follows. Action and variety are here too much suppressed in favour of analysis, as in other well-known instances of a poet's unpractised attempt in what is really another art than his own.

II. The four volumes of *Ballads and Poems*, between 1798–1800 and 1807, with the *Prelude*, form unquestionably the most important, the most charming body of Wordsworth's work. Among these are many poems in which admirable simplicity of feeling is joined to the happiest language and metre:—poems which, in their noble plainness, deserve the fine praise of Matthew Arnold; 'Nature herself seems to take the pen out of his hand, and to write for him with her own bare, sheer, penetrating power.' Such are the simple tales from lowly life, pathetic or meditative, (*Ruth*, *Lucy Gray*, the *Reaper*, the *Highland Girl*): tender love-poems, (*Three years*, *A slumber*, *She was a phantom of delight*): narratives or meditations in his very highest and purest manner, (*Tintern*, *The Brothers*, *Michael*): the lovely series of bird-pictures: many sonnets supreme in our sonnet-literature: ending with the *Ode on Immortality*, which a just judgment places also supreme among our reflective lyrics. The true balance between substance and art is here dominant: very few are the poems faulty from over-rusticity or over-elaborate language.

III. The *Excursion*, (1814), wherein the didactic element asserts itself too freely; the *White Doe*, (1815), idealism pure and exquisite in itself, yet, we must hold, pushed too far; two Odes on the Peace, somewhat overstrained and unlyrical, may open this stage of Wordsworth's mature life. But presently the poet, perhaps induced by the education which he was giving to his eldest son, broke new ground in the *Laodamia*, *Dion*, *Trajan's Pillar*: poems which have a unique character from the high spiritualism of their treatment. And with these may be joined the six odes to *Lycoris*, *September* and *May*: lovely at once in sunset glow, calm depth of feeling, and metrical skill. Here too fall the *Duddon* sonnets, Wordsworth's latest important study of the soul of landscape.

IV. The *Ecclesiastical Sonnets*, a singular monument of skilful historical narrative in that difficult form, though dating from 1820, may lead us to the poems of Wordsworth's genial old age. Here, whilst a serener pensiveness, a larger scope, is shown, and earlier faults of style avoided, we feel that the subjects are often less vividly conceived and handled. Yet here also not a few short pieces occur even to the poet's last years, so felicitous in thought and rendering as to show that the mighty hand had not lost its ancient cunning.

Wordsworth's dearly loved and honoured wife had fifty years before given his name to a lofty peak near Grasmere; and the lines he dedicated to it may fitly figure both the poetry and the tenour of his later years.

> There is an Eminence,—of these our hills
> The last that parleys with the setting sun;
> We can behold it from our orchard-seat;
> And, when at evening we pursue our walk
> Along the public way, this Peak, so high
> Above us, and so distant in its height,
> Is visible, and often seems to send
> Its own deep quiet to restore our hearts.

Or, as the final motto to his life and work, we may take the words of his only eminent follower in poetry, and say with the author of the *Christian Year*,—*Ad sanctiora erigit.*

The chief editions of Wordsworth's poetry were the author's editions published by Moxon (6 vols. 1836–37, and 1849–50; 1 vol. 1845), the library edition edited by Professor Knight (8 vols. 1882–86), that in one volume by John Morley (1888), and the Aldine edition by Professor Dowden (7 vols. 1893). Among selections are those of F. T. Palgrave (1865), Matthew Arnold (1879), and that of the Wordsworth Society, edited by Professor Knight (1888). The prose works were collected by Dr A. B. Grosart (3 vols. 1876). The chief Lives are by his nephew [Bishop] Christopher Wordsworth (2 vols. 1851); F. W. H. Myers, in 'English Men of Letters' (1880); J. M. Sutherland (1887); Elizabeth Wordsworth (1891); and that by Professor Knight (3 vols. 1889). The most important criticisms are those of Coleridge, De Quincey, George Brimley, Sir H. Taylor, Bagehot, Clough, M. Arnold, Stopford Brooke, Lowell, Masson, E. Dowden, R. H. Hutton, Shairp, Aubrey de Vere, Leslie Stephen, Dean Church, and Swinburne. The Wordsworth Society's Proceedings fill eight parts (1880–88), but perhaps its best fruit was the volume entitled *Wordsworthiana* (1889). See also De Quincey's *Recollections of Lake Poets*, J. S. Cottle's *Early Recollections of Coleridge* (2 vols. 1837), *Memorials of Coleorton* (2 vols. 1887), H. Crabb Robinson's *Diary* (3 vols. 1869), Dorothy Wordsworth's *Recollections of a Tour made in Scotland*, edited by Principal Shairp (1874), and *Dorothy Wordsworth: the Story of a Sister's Love*, by Edmund Lee (1886); also Professor Knight's books, *Through the Wordsworth Country* (1887) and *The English Lake District as interpreted in the Poems of Wordsworth* (1878). See also the articles COLERIDGE, SOUTHEY, WILSON (JOHN), and LAKE DISTRICT.

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DOROTHY WORDSWORTH, only sister of the poet, was born at Cockermouth on Christmas Day 1771. She set up housekeeping with her brother in the autumn of 1795 at Racedown Lodge in Dorsetshire, next at Alfoxden for a year (1797–98), enduring a noble poverty, then spent six months with him in Germany, and lived afterwards with him until the end at Grasmere and at Rydal Mount. His marriage in 1802 only widened the circle of her love. Her *Journals* kept at Alfoxden and Grasmere, and the records of her journeys in Scotland, the Isle of Man, Germany, France, Switzerland, and Italy, reveal a mind as subtly sensitive to nature as the poet's own, and an exquisiteness of expression, which, if he equalled, he never surpassed. Of her own choice she never married, but gave herself entirely for her brother, toiled and planned for him, and walked with him amongst the mountains beyond her strength to help him to see everything that could be turned to poetic use. She made herself a part not only of his life but of his imagination. But she had her reward in a love that never wavered, and that remains enshrined in some of the noblest verse in English literature. Hardly beautiful, bright-eyed and brown as a gypsy, she had a sweetness of nature, an intense sensibility to impressions, and a glowing heart that laid a spell on Coleridge, De Quincey, Charles Lamb, Crabb Robinson, and all who knew her. She had for some years shown signs of growing weakness, when in 1832 she had an attack of brain-fever from which she never entirely recovered. All hope of recovery was gone by 1836, yet she outlived her brother, and lingered till 25th January 1855. She was laid at the right side of his grave in Grasmere churchyard.

See the Lives of William Wordsworth, her own *Journal in Scotland* (ed. by Principal Shairp, 1874), and Edmund Lee's study (1886).

Wordsworth, CHRISTOPHER, youngest brother of the poet, was born at Cockermouth in Cumberland, June 9, 1774. From Hawkeshead grammar-school he passed in 1792 to Trinity College, Cambridge, and was elected a fellow in 1798. Successively rector of Ashby-with-Oby and Thirne in Norfolk (1804), dean of Bocking, Essex (1808), rector of St Mary's, Lambeth, Surrey, and of Sundridge in Kent (1815), he exchanged these two last livings for the rectory of Buxted-with-Uckfield, Sussex, in 1820. He was master of Trinity College, Cambridge, from 1820 until 1841, when he retired to Buxted, where he died, February 2, 1846. His best-known book is his *Ecclesiastical Biography*, a fine collection of selected and annotated lives (6 vols. 1809; 4 vols. 1839). His books, *Who wrote Icōn Basilikē?* (1824) and *King Charles the First the Author of Icōn Basilikē further proved* (1828), are learned if not conclusive. His *Christian Institutes* (4 vols. 1836) is a good selection from the writings of the great English divines.—Of his sons, the eldest, JOHN WORDSWORTH, was born at Lambeth, July 1, 1805, became a fellow of Trinity College, Cambridge, in 1830, took orders in 1837, and was preparing an edition of Æschylus and a classical dictionary, when he was surprised by death, December 31, 1839.—The second son, CHARLES WORDSWORTH, was born at Lambeth, 22d August 1806, passed from a private school to Harrow in 1820, and thence in 1825 to Christ Church, Oxford, where he gained the college and university prizes for Latin hexameters (1827), and graduated with a first-class in 1830. While an undergraduate he had played in the first cricket-match and rowed in the first boat-race between the universities. In 1830 he became private tutor, among his first pupils being Gladstone and Manning, and in 1834 public tutor at Christ Church, and was ordained deacon in 1835; he did not proceed to priest's orders until 1840. From 1835 to 1846 he was second master at Winchester, and then till 1854 warden of the new Episcopal college at Glenalmond (q.v.) in Perthshire. In 1852 he was elected Bishop of St Andrews, and for years thereafter was one of the foremost figures in Scottish ecclesiastical life, which he did much to sweeten by his numerous writings in favour of reunion between the churches. He was one of the New Testament revisers. His many works include, among others, the well-known Greek grammar (first published in 1839); *Shakespeare's Knowledge and Use of the Bible* (1854; 4th ed. 1892), and *Shakespeare's Historical Plays* (3 vols. 1883); several vols. of sermons, and numerous separate sermons, charges, &c., a number collected in *Public Appeals on Behalf of Christian Unity* (2 vols. 1886); and the valuable *Outlines of the Christian Ministry* (1872; new ed. 1893). See his *Annals of My Life* (vol. i. 1891).—The youngest son, CHRISTOPHER WORDSWORTH, was born at Bocking, October 30, 1807, and had his education at Winchester and Trinity College, Cambridge, where he carried off the Chancellor's medal for his poem, *The Druids* (1827), the Browne medals for the Latin ode and Greek epigram (1828), and graduated senior classic in 1830. He travelled in Greece in 1832–33, took holy orders, was elected fellow of his college in 1830, and in 1836 public orator to the university. He was an unsuccessful head-master of Harrow from 1836 till 1844, when he became canon of Westminster, was appointed vicar of Stanford-in-the-Vale, Berkshire, and rural dean in 1850, archdeacon of Westminster in 1865, and in 1868 was raised to be Bishop of Lincoln. He died at Lincoln, March 20, 1885, only a few weeks after resigning his see. His ideal of episcopal duty was high, but he lacked that breadth of view and of sympathy necessary to make a really great administrator. He was obstinate, incapable of seeing when he was in the wrong, and often harsh in phrase, but the singleness of his aims and his real nobility of character commanded the respect of all men. His *Athens and Attica* (1836), *Inscriptiones Pompeianæ* (1837), *Greece: Pictorial, Descriptive, and Historical* (1839; revised by H. F. Tozer, 1883), *Theocritus* (1844), and even *Conjectural Emendations* (1884) were sound contributions to classical scholarship. In 1842 he edited the *Correspondence of Bentley*, but he cannot in any sense be said to have achieved success in his Memoir (1851) of his illustrious uncle, the poet. Other works were his *Theophilus Anglicanus* (1843), Hulsean Lectures on the Canon (1848) and on the Apocalypse (1849); *S. Hippolytus and the Church of Rome in the Third Century* (1853); *The Greek New Testament* (1856–60); and *The Old Testament in the Authorised Version* (6 vols. 1864–71), a vast work of labour and research of the pre-scientific stage of such scholarship; *Miscellanies, Literary and Religious* (3 vols. 1878); and a *Church History to the Council of Chalcedon, 481* A.D. (4 vols. 1881–83); besides countless sermons and vigorous but one-sided controversial pamphlets and treatises on such questions of the day as baptism, secession to Rome, secular education, tithes, divorce, marriage with a deceased wife's sister, cremation, confession, Wesleyanism, sisterhoods, future punishment, the Revised Version, &c. See the Life by J. H. Overton and E. Wordsworth (1888).—The eldest son of the last, JOHN WORDSWORTH, was born at Harrow, September 21, 1843, had his education at Ipswich, Winchester, and New College, Oxford, graduated with a classical second class in 1865, and carried off the Chancellor's prize for Latin essay (1866) and the Craven scholarship (1867). For a short time assistant-master at Wellington College, he became a fellow of Brasenose College, Oxford, in

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1867, and served as tutor from 1868 till 1883. He was a prebendary of Lincoln (1870–83), examining chaplain to his father (1870–85), Grinfield lecturer on the Septuagint (1876), Bampton lecturer—*The One Religion* (1881), and from 1883 the first Oriel professor of the interpretation of Scripture (with canonry of Rochester attached). In 1885 he was raised to be Bishop of Salisbury. His chief books are *Fragments and Specimens of Early Latin* (1874), *University Sermons* (1878), *Old Latin Biblical Texts*—I. (1883; vols. ii. and iii. mainly by other scholars), and a critical edition of the Vulgate New Testament (parts i.–ii. 1889–90). He had a share also in the first series of the Oxford *Studia Biblica* (1885).

Work. See DYNAMICS, ENERGY, FORCE, HORSE-POWER, MOTION, POWER.

Work, HENRY CLAY, song-writer (1832–84), born at Middletown, Connecticut, attracted notice during the American civil war by his war-songs, of which 'Marching through Georgia' is best known. Of nearly a hundred songs of his the most popular were 'Lily Dale' and 'My Grandfather's Clock.'

Workhouse. See POOR-LAWS, p. 314.

Workington, a municipal borough and seaport of Cumberland, at the mouth of the Derwent, 7 miles N. of Whitehaven by rail. Its harbour, furnished with a breakwater (1873) and several quays, is safe and commodious; and there are nearly 100 vessels, some of them of 250 tons burden, belonging to the port. To the coal-mines in the vicinity the town chiefly owes its prosperity, great quantities of coal being exported; and there are large ironworks and other industrial establishments here. A large Sheffield steel foundry was transferred hither, on account of the cost of transit to the seaside, in 1883. The salmon-fishery near is important. Mary Queen of Scots landed here, on her flight from Langside, 16th May 1568, and was entertained at Workington Hall (the seat of the Curwens from about 1160 till the present day). Workington was incorporated by royal charter as a municipal borough in 1888. Pop. (1881) 14,109; (1891) 23,522.

Works, BOARD OF. In 1806 the management and control of public works and buildings, of which the expenses are defrayed from the crown revenues or parliamentary grants, were entrusted to an officer called the Surveyor of His Majesty's Works and Public Buildings. In 1832 the duties of this officer were transferred to the Commissioners of Woods, Forests, and Land Revenues (see WOODS AND FORESTS); but this arrangement eventually resulted in a complaint that the crown revenue was applied too easily to the execution of public works and improvements, and that parliament was unable to exercise proper control. The department of Public Works was therefore again separated, in 1851, from that of the Woods and Forests, and placed under the management of a new Board, called the Board of Works and Public Buildings, composed of a First Commissioner, who is a political officer, and sometimes has a seat in the cabinet, together with the Secretaries of State, and the President and the Vice-president of the Board of Trade, who are *ex-officio* commissioners. In addition to the control over public works and buildings possessed by the former united Board, the Board of Works has also the management of the parks in the metropolis, including the public parks formed under recent acts, and of Richmond, Greenwich, Bushy, Phœnix, and Holyrood Parks, and the public gardens at Kensington, Kew, and Hampton Court. Among the duties of the Board are the providing of public walks, and access to the national buildings and collections—a branch of administration which has, of late years, assumed a prominence which it did not formerly possess. The Board is also charged with many arrangements and responsibilities connected with the making of new streets and roads, in London and elsewhere, and the erection and repair of public statues. The Board of Works is under control of the Treasury, to whose sanction all large estimates for public works must be submitted. The Treasury appoint the secretary, clerks, and other officers of the establishment; and with the sanction of the Treasury the Commissioners appoint or employ such architects, surveyors, &c. as may be necessary.

Workshop Acts. See FACTORY ACTS.

Worksop, a town of Nottinghamshire, on the river Ryton and the Chesterfield Canal, 16 miles ESE. of Sheffield and 23 N. of Nottingham. It lies near the northern extremity of Sherwood Forest (q.v.), in a district known as the 'Dukery,' from the number of ducal seats. There is Worksop Manor, in whose predecessor (destroyed by fire in 1761) Mary Queen of Scots was a prisoner under the Earl of Shrewsbury, and which, formerly a seat of the Duke of Norfolk, was purchased in 1840 for £350,000 by the Duke of Newcastle. His, too, is Clumber Park (q.v.); and there are also Welbeck Abbey (q.v., Duke of Portland) and Thoresby Park (till 1773 Duke of Kingston, now Earl Manvers). Worksop church was that of an Augustinian priory (1103), of which there is also a Decorated gateway, but a Norman keep has vanished. Modern buildings are the corn exchange (1854), Venetian in style, and the Mechanics' Institute (1852). Malting is the chief industry, with brass and iron founding, and manufactures of chemicals, agricultural implements, &c. Pop. (1851) 7058; (1891) 12,734. See works by J. Holland (1726), R. White (1875), and Sissons (1888).

World in the widest sense means the universe, the whole system of created things (as contradistinguished from God). In this sense the world, and facts and problems in regard to it, are discussed at ASTRONOMY and other articles cited there (such as SOLAR SYSTEM, STARS, COMETS, ETHER, &c.), CREATION, COSMOGONY, DARWINIAN SYSTEM, and in many of the articles on philosophical and theological systems, such as PANTHEISM, NEOPLATONISM, &c. In the narrower sense it means the terraqueous globe, discussed in its physiographical relations in the article EARTH, where are described its figure, dimensions, mass, mean density and constitution, its surface, movements, the distribution and work of solar energy. The areas in detail of the great land-divisions of the world will be found under CONTINENTS. As to the population of the earth Wagner and Supan in the *Bevölkerung der Erde* for 1891 give the following estimates:

Europe (without Iceland, Atlantic islands, &c.)	357,379,000
Asia (without the Polar islands)	825,954,000
Africa (without Madagascar, &c.)	163,953,000
America (without Polar regions)	121,713,000
Australia and Tasmania	3,230,000
Oceanic Islands	7,420,000
Polar Regions	80,000
Total	1,479,729,000

The following table shows approximately the numbers professing the chief faiths of the world:

Buddhists	500,000,000
Hindus	160,000,000
Mohammedans	155,000,000
Confucians	80,000,000
Adherents of Shintoism (in Japan)	14,000,000
Jews	7,000,000
Christians—	
Roman Catholics	152,000,000
Greek Catholics	75,000,000
Other Christians	100,000,000
Various Heathens	237,000,000
	1,480,000,000

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See also the articles CHRONOLOGY, ETHNOGRAPHY, GEOGRAPHY, GEOGRAPHICAL DISTRIBUTION, GEOLOGY (for the age of the Earth, see there at p. 154), MAN (for the antiquity of the human race), POPULATION, and books cited at VITAL STATISTICS.

Worm Grass. See SPIGELIA.

Worms, an ancient and interesting town of Hesse-Darmstadt, in a highly fruitful district on the left bank of the Rhine, 25 miles SW. of Darmstadt by rail. Among its churches the chief is the cathedral, a massive Romanesque building in the Byzantine style, with two cupolas and four towers, founded in the 8th, rebuilt in the 11th and 12th centuries, and carefully restored in the last quarter of the 19th century. On a hill near the church called the Liebfrauenkirche a highly esteemed wine, called *Liebfrauenmilch*, is grown. The synagogue is one of the oldest in Germany. The town-house was restored in 1884. There are some manufactures of leather, soluble glass, soap, bone-dust, printing and other machinery, and furniture. Pop. (1880) 19,005; (1890) 25,504. The manufacture of polished leather employs 1200 hands; tobacco is also manufactured, and a trade in the wines and the agricultural produce of the vicinity is carried on. Worms is one of the oldest cities of Germany; in it is laid the scene of the Nibelungenlied (q.v.). It was occupied by the Romans, destroyed by Attila, and afterwards rebuilt by Clovis. It was frequently the residence of Charlemagne and his Carlovingian successors, was the place of convocation of many German diets, and was erected into a free imperial city by the Emperor Henry V. The most famous diet held here was that in 1521, at which Luther defended himself before Charles V. and the princes of the empire, commemorated by an imposing monument to Luther erected at Worms in 1868. It was an imperial free city, and its bishopric was all but a separate state. The industry and commerce of Worms were great during the middle ages, and its population, as far back as the time of the Hohenstaufens, averaged 60,000, and amounted to 30,000 even at the close of the Thirty Years' War; but it was almost wholly destroyed by the French in the destructive war of 1689, and, though soon after it was rebuilt on a smaller scale, it has never recovered its former prosperity. Here, in 1743, an offensive and defensive alliance was entered into by Great Britain and Austria with Sardinia.

Worms, or VERMES, a term destitute of scientific precision, but often applied to the members of numerous classes of invertebrate animals which are more or less earthworm-like in appearance. It is little more than a convenient name for a shape, for among the forms called 'worms' the variety of internal structure is so great that no common characters can be noted beyond the general occurrence of bilateral symmetry. The numerous classes include many types of much interest on account of the affinities which they present to other types of animals. The higher forms, known as Annelids, consist of a series of homologous segments; the lower forms are unsegmented. In the present state of our knowledge as to the affinities of 'worms,' all that can be attempted here is to give a catalogue of the various classes, arranged in a manner which cannot pretend to be more than provisional.

PLATHELMINTHES or SCOLECIDA (Flat-worms).	TURBELLARIA.—Small 'worms,' usually aquatic, often known as Planarians (q.v.)—e.g. Planaria, Convoluta, Vortex. TREMATODA.—Parasitic 'flukes'—e.g. Distomum. See FLUKE. CESTODA.—Parasitic 'tapeworms'—e.g. Tænia. See TAPEWORM.
NEMERTEA.—Free-living aquatic worms—e.g. Nemertes, Lineus. See NEMERTEA.	
NEMATHELMINTHES (Round-worms).	NEMATODA.—Thread-worms, some free, most parasitic—e.g. Ascaris (q.v.), Trichina (q.v.), Gordius. See THREAD-WORMS, &c. ACANTHOCEPHALA.—Parasitic. Echinorhynchus (q.v.).
ANNELIDA	DISCOPHORA, or HIRUDINEA. Leeches—e.g. Hirudo. See LEECHES. CHÆTOPODA.—Bristle-footed Annelids. (1) Oligochæta—Earthworms (q.v.); (2) Polychæta—marine worms, both free-swimming and sedentary—e.g. Nereis, Aphrodite (see SEA-MOUSE), Arenicola (Lobworm), Serpula; (3) Echiuridæ, bristly 'Gephyreans'—e.g. Echiurus, Bonellia. Related types, (*a*) Archi-annelida—primitive forms—e.g. Polygordius, and (*b*) Myzostomata, parasitic on Crinoids.
	Incertæ sedis, perhaps related to Chætopods—(1) Chætognatha—e.g. Sagitta (q.v.), (2) Rotatoria (q.v.), or Rotifera.
VERMES INCERTÆ SEDIS.	SIPUNCULOIDEA—e.g. Sipunculus (q.v.). PHORONIDEA—Phoronis. POLYZOA, or BRYOZOA. See SEA-MAT. BRACHIOPODA (q.v.), or LAMP-SHELLS.

Worms as a Disease of Childhood.—The articles dealing with Ascaris, Cestoid Worms, Tapeworm, Thread-worms, Parasitic Animals, and Vermifuges treat of the natural history of the worms infesting the human subject, and of the remedies to be employed for their expulsion, so here need only be noticed the symptoms which are usually considered to be indicative of the presence of worms in children. These symptoms are, however, in reality, only evidence of irritation of the mucous membrane of the intestinal canal, which may be due to other causes than worms, as, for instance, the presence of indigestible matter, unhealthy secretions, or the existence of a morbid condition of the membrane itself. 'Perhaps few of the symptoms—and they are very numerous—which are found while worms exist in the body can be directly attributed to the presence of these parasites, as they may all of them, or nearly all, be found also in cases where repeated purgatives have convinced us that worms are absent. They are therefore probably due in great part to the abdominal derangement which favours the development of the entozoa' (Eustace Smith, *Wasting Diseases of Children*, 4th ed. p. 231). Although then the symptoms commonly referred to the presence of worms may exist without them, yet there is a group of symptoms which, when occurring together, should, at all events, excite our suspicions. These symptoms are divisible into two groups. The first, those dependent directly on the presence of worms in the intestines, comprise loss of flesh; appetite capricious, sometimes excessive; pain or discomfort in the abdomen; irregular action of the bowels and much mucus, sometimes blood, in the stools. The second group comprises the symptoms connected with the sympathetic relations of the digestive organs, and due to some form of reflex nervous action, and amongst the most marked of them are those of the head. The sleep becomes unquiet, and the little patient is liable to start up suddenly from slumber; grinding of the teeth is common; the pupils are often dilated, and there may be headache, and sometimes convulsions—symptoms painfully like those of Hydrocephalus (q.v.), but often disappearing on the expulsion of worms. Itching of the nose is frequently present. A dry cough, unaccompanied by any signs of disease of the thoracic organs, is regarded as a sympathetic or reflex symptom of worms; and vomiting and hiccough often accompany their presence.

The Round-worm (*Ascaris lumbricoides*) may be present in the small intestine (its ordinary seat) in large numbers without occasioning any disturbance; but when symptoms are present

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the most prominent are sharp colicky pains about the navel, nausea, faintness, and other nervous disturbances. The Tapeworm (Tænia) may also cause pain in the belly; emaciation is sometimes very marked, but reflex disturbances are less common than in the case of round-worms. The Thread-worm (*Oxyuris vermicularis*) chiefly occurs in the large intestine, where it often exists in large numbers, looking like bits of cut thread. In a recently voided stool they are seen to be in rapid motion; hence they are called Ascarides (from the Greek *askaridzein*, 'to jump'), and hence also, in all probability, the great local irritation which they occasion as compared with the quiet round-worms. The characteristic sign of the presence of these thread-worms is the itching and irritation felt at the anus. Other parasitic worms, as Bilharzia, Guinea-worm, and Trichina, are separately discussed. The worms by which Herod was eaten are interpreted to mean a kind of lice (*Pediculus tabescentium*; see LICE), credited with multiplying with awful rapidity and burrowing in the flesh.

The 'worms' implied in worm-eaten furniture or books are rather insects or their grubs; see BARK-BEETLES, BOOKWORM, BORERS, BORING-ANIMALS.

The *Worms of the Dog* belong principally to the two classes Nematoda or round-worms and Cestoda or tapeworms. The commonest round-worm is *Ascaris marginata*, infesting stomach and intestines; *Dochmius trigonocephalus*, also found there, and *Tricocephalus depressiculus*, or whip-worm (in the cæcum), are of less importance. Other round-worms are *Filaria immitis*, found in the heart, and *Strongylus gigas* in the kidneys. The latter, though the largest of the Nematodes, does not always cause inconvenience to the host; sometimes, however, there has been continual wasting of the flesh; in other instances great pain has been manifested by howling night and day; and in some instances the urine has contained blood or purulent matter, and the dog has been observed to walk with its body curved to the affected side when the worm is in one kidney only.

The tapeworms are well known to infest two hosts. In the herbivora they are found in the embryonic or cystic stage, and then appear as bladders containing fluid (bladder-worms). The most common in Britain are (1) *Tænia cœnurius*, which infests the intestines of the dog in its mature stage, whilst the cystic form, the *Cœnurus cerebralis*, is found in the brain of the sheep, sometimes that of cattle, very rarely in the brain of the horse. (2) *Tænia serrata* ('sawlike') is found in the larval or cystic form (*cysticercus pisiformis*) in the peritoneal cavity of hares and rabbits; these are eaten by the dog, and arrive at the mature stage in the intestines of that animal; the segments of the worm, as is the case with other tapeworms, are expelled with the fæces of the host, and the ova or eggs which they contain escape and are scattered over the grass, which is eaten by the herbivorous host, and there become hatched. (3) *Tænia echinococcus* is, in the mature stage, a very small tapeworm, but in its embryonic form it attains large dimensions, and is called the *Echinococcus veterinorum*, and is found in the liver, lungs, kidneys of man, the Ruminantia, and the pig. It is very prevalent and destructive to human life in Iceland. (4) *Tænia cucumerina* ('cucumber-shaped') is a small but long tapeworm, the segments of which when mature escape from the intestines and discharge their ova on the skin of the dog, and are there eaten by the dog-louse, *Trichodectus latus*, or dog-flea, *Pulex seriaticeps*, in the bodies of which the ova are hatched and assume the cystic form. The fleas and lice irritate the skin of the dog, who in hunting for them with his teeth swallows some of them and the contained ova, which become hatched and assume the mature form in its intestines. In this way the presence of this tapeworm in sucking puppies is accounted for. (5) *Tænia marginata* is the largest tapeworm found in the dog, and is the mature form of the *cysticercus tenuicollis* which is found in the peritoneal, pleural, and even in the pericardial sac of various animals, particularly the Ruminants. In addition to the above the following Tænia are sometimes found in the dog: *Tænia krabbei*, *T. serialis*, and *T. litterata*; and another form of tapeworm, called the *Bothriocephalus latus*—which also exists in man—the cystic stage of which is found in fish, particularly the pike and burbot; and in Greenland a shorter species of this worm is found in the dog and once only in man. As to *treatment*, for tapeworms areca nut and the oil of the male shield fern, succeeded by a purgative, and for round-worms santonin, succeeded by a purgative, are the most reliable remedies.

A worm is found in the nasal cavities of the dog called *Linguatula tænoides*, and is classified under the Arachnida. Its presence causes irregular fits of sneezing, difficult inspirations, and a discharge of mucus, containing ova, from the nose.

Worm-seed is the popular name for santonica, from which Santonin (q.v.) is extracted.

Wormwood is the popular name for *Artemisia absinthium*, the genus Artemisia, belonging to the Compositæ, being a very numerous one, found especially in the dry regions of the northern hemisphere. There are forty species found in the United States. The Common Wormwood of Britain (*A. absinthium*) not only acts as an anthelmintic, as its name implies, but it likewise possesses tonic and stimulant properties. An infusion of wormwood, made by pouring a pint of boiling water over an ounce and a half of the dried plant, letting it stand for an hour, and straining, taken in doses of a couple of ounces once or twice a day, is a very good domestic tonic, and may be prescribed with advantage even in cases where worms are not suspected. The genus is a large one, the qualities of the wormwood being pretty uniformly present in all. Some of the species, especially *A. glacialis* and *A. mutellina*, natives of Switzerland, are used in the manufacture of Absinthe (q.v.). Tarragon (*A. dracunculus*) imparts the fine aroma to the vinegar of that name.

Wormwood (*Artemisia absinthium*).

Wormwood Scrubs, a district with a common, a railway station, and a prison, on the western outskirts of London, nearly 3 miles NW. of the Marble Arch in Hyde Park.

Wornum, RALPH NICHOLSON, the founder of scientific art criticism, was born at Thornton, Northumberland, 29th December 1812, and, having since 1853 been keeper and secretary of the National Gallery, died at Hampstead, 15th December 1877.

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Worsaae, JENS JACOB ASMUSSEN, Danish archæologist, was born at Vejle in Jutland, 14th March 1821. From the gymnasium of Horsens he proceeded to Copenhagen, where, soon abandoning the study of first divinity and then law, he turned his whole attention to the history and archæology of the north, and from 1838 to 1843 was assistant in the Royal Museum of Northern Antiquities. Between 1842 and 1854, when he was nominated to the honorary rank of professor in the university of Copenhagen, Worsaae made repeated visits to the other Scandinavian lands, to Great Britain, Germany, France, and other parts of central Europe, which retained traces of the former presence of the Northmen. These journeys, whose cost was largely defrayed by the Danish government, bore fruit in numerous works and papers of interest, three of which have been translated into English as *Primeval Antiquities of England and Denmark* (1849), *The Danes and Norwegians in England* (1852), and *Pre-history of the North* (1886). Somewhat inclined to exaggerate Scandinavian influences, Worsaae always showed himself an ardent patriot, and a strenuous opponent of the spread of German tendencies in the duchies, and his views in this direction were forcibly enounced in his *Jylland's Danskhed* (1850), especially directed against Jacob Grimm's exposition of the question of German national law. His merits were fully recognised by his countrymen; and the Danish government constantly showed its sense of the estimation in which he was held by placing him at the head of archæological commissions, and by appointing him to important posts in connection with the University and Antiquarian Museums. He was minister of education, 1874–75, and died near Holbäk in Zealand, 15th August 1885.

Worsborough, a town in the West Riding, 2½ miles S. of Barnsley, with manufactures of iron, glass, paper, gunpowder, &c. Pop. (1891) 9905.

Worsted. See WOOL.

Wörth, a village (pop. 1064) of Alsace-Lorraine, about 10 miles SW. of Wissembourg (Weissenburg), where, on the 6th August 1870, the French were defeated with great loss by the Germans; see FRANCE, Vol. IV. p. 782.

Worth, CHARLES FREDERICK, costumier, born at Bourn in Lincolnshire, went to Paris in 1846, and presently started an establishment for the making of fashionable costumes. He achieved great success as a designer of fashions, and his establishment in the Rue de la Paix came to be regarded as the first emporium for the latest Paris fashions, employing not much short of a thousand workwomen, four-sevenths of them inside, and the rest outside. M. Worth is himself the designer of the new styles which emanate from his establishment.

Worthing, a fashionable watering-place on the Sussex coast, 10½ miles W. by S. of Brighton and 56 SSW. of London. It has risen from a small fishing-village since 1760, its growth being rapid after visits of the Princess Amelia (1797) and the Princess Charlotte (1807). The climate is much milder than that of Brighton, the town and its immediate neighbourhood being encircled on the north and north-east by the Downs, which shelter it from cold winds, and render it one of the best winter-resorts on the south coast. There are capital sands, a parade 1½ mile long, a public park of 18 acres (1881), and an iron pier (1862) 320 yards long. Fruit-growing is carried on to a considerable extent, many acres of land being covered with glass structures. Worthing was constituted a municipal borough in 1890. Pop. (1851) 5370; (1881) 11,821; (1891) 16,606.

Wotton, SIR HENRY, traveller, diplomatist, scholar, and poet, was born of ancient family at Boughton Malherbe in Kent in 1568. He had his education at Winchester, and first at New College, then Queen's College, Oxford, and in his twentieth year proceeded master of arts. He stayed two years at Oxford adding to his great wit the ballast of learning and knowledge of the arts, then set out for a nine years' sojourn in France, Germany, Rome, Venice, and Florence. At Oxford he had begun a life-long friendship with Donne; at Geneva he made the familiar acquaintance of Beza and Isaac Casaubon; and on his return Essex admitted him to his intimacy. On his friend's downfall he betook himself to France, next to Italy, and was sent by Ferdinand, Duke of Florence, on a secret mission to King James VI. of Scotland with intelligence of a plot against him, and the Italian antidotes against poison. James on his succession to the throne of England summoned him from abroad, knighted him, and sent him ambassador to Venice (1604). Here he lived throughout the struggle with the court of Rome, and it was through his hands that Sarpi's famous history of the Council of Trent was communicated sheet by sheet to King James. After eight years he almost lost the king's favour owing to the publication by the scurrilous Romanist Scioppius, to the discredit of Protestant princes, of an epigram he had once written carelessly in a friend's album in Germany: *Legatus est vir bonus peregrè missus ad mentiendum Reipublicæ causa*, which Walton says Sir Henry Wotton could have been content should have been thus Englished: 'An Ambassador is an honest man, sent to lie abroad for the good of his Country.' But unfortunately the Latin did not leave a means of escape by the loophole of ambiguity. The king, however, was satisfied with Wotton's apology, saying that he 'had commuted sufficiently for a greater offence.' He was employed continuously for nearly twenty years, chiefly at Venice, next sent to several of the German princes and the Emperor Ferdinand II., returning to England a poor man in 1624, the year before the death of King James. He was made Provost of Eton, and entered into holy orders with all convenient speed. Here for fifteen years he lived, his days gliding past in quiet study and meditation, in encouraging the studies of the more hopeful youth, in cheerful conversation with his friends, and in angling, which he called his 'idle time not idly spent.' He meant to write the Life of Luther, but at the request of Charles I. applied himself to the history of England, and had indeed begun his task when he died 'in great tranquillity of mind and in perfect peace with God and man,' December 1639. He was buried at Eton under a plain gravestone, whereon was written by his own desire this prudent pious sentence to discover his disposition and preserve his memory: 'Here lies the first author of this sentence, "The Itch of Disputation is the scab of the Churches"' (*Disputandi pruritus ecclesiarum scabies*). Another of his sayings, and one more original than this, was his advice to a young diplomatist, 'that, to be in safety himself, and serviceable to his country, he should always, and upon all occasions speak the truth (it seems a State-Paradox), for, says Sir Henry Wotton, you shall never be believed; and by this means, your truth will secure yourself, if you shall ever be called to any account; and 'twill also put your Adversaries (who will still hunt counter) to a loss in all their disquisitions and undertakings.'

Wotton's tracts, letters, &c. were collected as *Reliquiæ Wottonianæ* (1651), prefaced by Izaak Walton's exquisite biography in miniature. One of the few poems is known to all lovers of good English: 'The Character of a Happy Life.' See Foster Watson in *Gentleman's Magazine* for March 1892.

Woulfe's Bottles. See WOLFFIAN BOTTLES.

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Wounds may be defined to be divisions of soft parts, including the skin, produced by external mechanical force. They are generally divided into (1) *incised wounds*, such as cuts or incisions, including those which remove a portion of the body; (2) *punctured wounds*, such as stabs; (3) *contused wounds*, in which the divided parts are bruised or crushed; (4) *lacerated wounds*, in which there is tearing of the tissues; (5) *poisoned wounds*, in which some poison or venom is inserted.

Simple, open, incised wounds will be more fully noticed than any of the others, because they have been most fully studied, and in their surgical relations are the most important. In a clean cut, whether made accidentally or in a surgical operation, three things are chiefly to be observed—viz. the opening or gaping by the retraction of their edges, the bleeding, and the pain. The *gaping* of a wound is caused by the retraction of the various tissues which are divided. Of the various tissues the skin exhibits the greatest degree of retraction, and then (in the order in which they stand) elastic tissue, cellular or connective tissue, arteries, muscles, fibrous tissues, nerves, and cartilages. In addition to the immediate gaping of fresh wounds, many wounds, if they be not prevented, will continue to retract for a long time. For example, in stumps that heal slowly the limb terminates in a cone, in consequence of the prolonged retraction of the muscles. The *bleeding* from an incised wound depends chiefly on the size and number of the divided vessels, and on their connection with the surrounding parts, but to a certain extent on the previous condition of the wounded part, or on the peculiar constitution of the patient. Gradually, with or without surgical help, the vessels cease to bleed; and then, if the wound be left open, there is an oozing of blood-tinged serous fluid, succeeded gradually by a paler fluid which collects like a whitish film on the surface, known as *lymph* (see under INFLAMMATION), and contains an abundance of white or colourless blood-cells, imbedded in a fibrinous (and therefore spontaneously coagulating) fluid. The nature of the *pain* cannot be made clear by any description to those who have not felt it; and it is more than probable that a similar wound inflicted on two or three persons would occasion different degrees of pain in each. There are also differences in both the kind and degree of pain, according to the place and manner of the wound. The skin is more sensitive than the deeper parts; that of the face, hands, and feet more sensitive than that of most other parts of the body. The *local consequences* of an incised wound are indicative of inflammation. In the course of an hour or more the edges of the wound and the adjacent parts become swollen and abnormally sensitive, feel hot and aching; the sutures (if any have been inserted) become tighter, and the edges and intervening spaces gape in consequence of the swelling. These symptoms gradually subside in two or at least four days, unless there is some abiding source of irritation. Except in very severe wounds, no *general consequences* are apparent. In these exceptional cases, as in amputations, for example, a Shock (q.v.) and subsequent reaction are observed. The duration of this feverish reaction or traumatic fever does not seem to bear any fixed relation to the severity of the injury. Sometimes it subsides within twenty-four hours; more often, after large wounds, it does not subside for three or four days. If constitutional disturbance should last more than four or five days after the receipt of the injury, there is probably some persistent irritation or some morbid complication.

The *healing* of open incised wounds may be accomplished, according to most surgical authorities, in five different ways: (1) *Healing by immediate union* takes place when the wounded parts being placed and maintained in contact first stick together, and then become continuous, without the formation of any new material as a connecting medium. For example, a flap of skin is raised by dissection in the removal of a tumour or a mammary gland, and is then replaced on the subjacent parts. In three days at most the union may be complete, without any indication of inflammation, there being no evident efflux of blood, no exudation of reparative material, and no scar. (2) In *healing by primary adhesion* lymph exudes from both cut surfaces, becomes organised, gradually connects the cut surfaces, and at length forms between them a firm layer of connective tissue, covered with a thin shining cuticle. These steps are well seen after the operation for hare-lip, for example. These two methods are known as healing by *first intention*. (3) *Healing by scabbing*, or under a scab, is the most natural and in some cases the best of all the healing processes. In animals it is often observed that if a wound be left wide open the blood and other exudations dry on its surface and form an air-tight covering, under which scarring takes place, and which is cast off when the healing is complete. In man this process is less frequent, because, in the first place, exudations seem to be more often produced under the scab, which detach it and prevent the healing; and secondly, surgical interference seldom allows this method to have a fair trial. The first three methods are obviously the most desirable, and should be aimed at whenever it is possible to do so. (4) In *healing by granulation* or *second intention* the wound becomes coated over with a film of lymph, which, if the wound be left open, increases, becomes reddened by the development of blood-vessels within it, and is transformed into granulations. We cannot enter into the life-history of these granulations, and can only remark that they are finally developed into a scar consisting of fibro-cellular or connective tissue, with a superficial layer of epidermis. The completion of the healing is accomplished by the gradual improvement of the scar, in which the connective tissue becomes more perfect in its character, and the cuticle becomes thicker and more opaque. (5) *Healing by secondary adhesion*, or by *third intention*, is accomplished by the union of two granulating surfaces (e.g. those of two flaps after amputation) placed and maintained in contact.

In the treatment of incised wounds there are four main points to be attended to: (1) Arrest of hæmorrhage, by pressure with the finger or a pad of lint, by cold, or, if arteries of any size have been divided, by their ligature or torsion (see BLEEDING). (2) Removal of any foreign bodies which may have been introduced. (3) Accurate apposition of the sides and edges of the wound by pads and bandages, by plasters, or by Sutures (q.v.), according to the size and position of the wound and the degree of gaping which has to be counteracted. (4) Prevention of decomposition in the wound and its discharges (see ANTISEPTIC SURGERY).

Of the other varieties of wounds it is sufficient to notice the most important points severally peculiar to each variety. Of *punctured wounds* the most serious are those which are made with blunt-pointed instruments, such as nails, pitch-forks, iron spikes, &c., for by these the injured parts are not so divided as that they may retract, but are pressed aside with much bruising, and can close again as soon as the instrument is withdrawn; and in this lies the chief danger of these wounds, because blood or other fluids are likely to extravasate into them, and cannot readily escape. These fluids, by decomposing

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or by mere pressure, may excite inflammation, and thus cause deep and confirmed suppuration and great destruction of tissues. *Contused and lacerated wounds* are much more severe and dangerous than incised wounds of the same size, because the adjacent tissues are bruised and injured, and sloughing is very apt to occur. Such wounds on the limbs, if extensive, often necessitate amputation. If union is to be attempted, the rules given for the treatment of incised wounds must be followed, especial attention being paid to their careful cleaning, the removal of clots of blood, and their warm covering with some soft material, as cotton-wool. In no cases is careful antiseptic treatment at first of more importance or of more signal benefit than in severe wounds of this class. *Gunshot wounds* are merely a special group of contused and lacerated wounds, which from their great importance in military surgery have a large literature of their own.

Of *poisoned wounds* the most important are the bites of Snakes (q.v.) and other venomous reptiles, the stings of insects, the bites of rabid animals (see HYDROPHOBIA), and Dissection Wounds (q.v.). See also VENOMOUS BITES.

In conclusion it must be mentioned that various kinds of wounds are liable to certain complications, of which some are local and others general or constitutional. Among the former are recurring or secondary bleeding, pain, spasmodic muscular movements, and the presence of foreign bodies; whilst the latter include defect or excess of reaction, traumatic delirium, fever, erysipelas, pyæmia, tetanus, &c. Some of these complications are treated of in special articles of this work; and for the treatment of the remainder we must refer to Holmes's *System of Surgery*, or other standard works.

Woundwort. See STACHYS.

Wouverman, PHILIP, a Dutch painter of battle and hunting pieces, was born in May 1619 at Haarlem. From his father, Paul Wouverman, a historical painter, he inherited a taste for art. He studied first with his father, and afterwards with John Wynants. He passed his entire life at Haarlem in the assiduous practice of his art, and died 19th May 1668. Though his pictures are now highly valued, he is said to have had little immediate success, and to have lived in poverty, pretty much in the hands of the picture-dealers. His pictures are, for the most part, landscapes of small size, with figures profusely introduced, commonly in energetic action. His cavalry skirmishes, with a white horse generally in the foreground, are greatly admired for their spirit and vigour. He had two brothers, also painters, PETER (1623–82) and JAN (1629–66), who executed subjects somewhat similar, and whose works have not unfrequently been attributed to him; but, though both artists of considerable merit, they are plainly much inferior to Philip.

Wrack, a term loosely given to various seaweeds, especially to the Fucaceæ, common on British shores, long valuable as a source of Kelp (q.v.), and utilised as manure. See SEAWEEDS, FUCUS, KELP. For Wrack Grass, see GRASS-WRACK.

Wrangel, FRIEDRICH HEINRICH ERNST, Prussian field-marshal and count (1784–1877), born in Stettin, joined a dragoon regiment, took a distinguished part in the campaigns of 1807, 1813, and 1814, and rose steadily till in 1848 he was general and commander of the Prussian and Federal troops in Sleswick-Holstein. In that year he marched into Berlin and crushed the insurrectionary movement there; in 1856 he became a field-marshal; in 1864 he had supreme command over Prussian and Austrian troops in the Danish war; and, ennobled in 1866, was still able to be present, though without command, with the Prussian army during the Austro-Prussian war.

Wrangel Land, an island in the Arctic Ocean, lying north of the eastern extremity of the Asiatic coast, and intersected by the meridian of 180° E. long. It was seen by the Englishman Kellett in 1849, again discovered by the American Long in 1867, and named after the Russian explorer Wrangel (1796–1870), who sought in vain to reach it in 1821–23. It was first explored by the American expedition under Hooper and Berry in 1881. There seem to be other islands beyond it.

Wrangler, the name given in the university of Cambridge to those who have attained the first class in the public mathematical honour examinations, the student who heads the list in order of merit being called the Senior Wrangler. The word 'wrangler' is derived from the public disputations in which candidates for degrees were in former times required to exhibit their powers. The examination is confined to mathematics, pure and mixed; it is conducted by two moderators and two examiners, with an additional examiner. Down to the year 1882 the undergraduates who satisfied the examiners were arranged in order of merit in three classes—*wranglers*, *senior optimes*, and *junior optimes*. Between 1882 and 1885 inclusive those who attained the rank of wranglers in the examination held in June of each year were admissible to a higher and more special examination held in January of the following year, after which they were arranged in three divisions, according to their respective merits, but the names under each division were placed in alphabetical order. From 1886 to 1892 those who proceeded to the higher examination were placed in three classes, each consisting of three divisions, the alphabetical arrangement holding good as before. From 1893 there are two examinations of four days each, with an interval of eleven days between; those only who have acquitted themselves during the first four days so as to deserve honours are admitted to the examination of the second four days, after which they are arranged strictly according to merit, under the old divisions of wranglers, senior optimes, and junior optimes. The last man of the junior optimes is often called 'Wooden Spoon.' See CAMBRIDGE, UNIVERSITY OF.

Wrasse (*Labrus*), a genus of bony fishes representative of the large family Labridæ, and including many species on European and north African coasts. The body is covered with cycloid scales; the form tends to be oblong; there is a single dorsal fin with a long spinous and shorter soft portion;

Ballan Wrasse (*Labrus maculatus*).

the teeth on the fused lower pharyngeal bones are adapted to crush the shells of molluscs and crustaceans; the teeth on the jaws are conical and

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disposed in a single series. The colours are frequently brilliant. The flesh is not much esteemed. The Ballan Wrasse (*Labrus maculatus*) is common and widely distributed, often occurring among the seaweed in deep pools on rocky coasts. It measures 18 inches or more in length; is brightly coloured, often with a red back, an orange belly, orange-red paired fins, and bluish-green unpaired fins; feeds on crustaceans and worms; spawns in spring and summer. The Cook Wrasse (*Labrus mixtus*), also known as Red, Striped, and Spotted Wrasse, is not unfrequent on the southern coasts of England. The adult male is dark greenish above, yellow to orange beneath, with stripes of blue; the female is markedly different, being red with black blotches. In length the male measures about 14 inches, the female about a foot. In summer they live near the rocks, feeding on crustaceans; in autumn they seek deeper water. Nearly related to the genus Labrus is the Corkwing (*Crenilabrus melops*); and the allied genera Ctenolabrus, Acantholabrus, Centrolabrus are also represented on British coasts. A common American fish (*Ctenolabrus adspersus*), known by a variety of names, such as burgall, blue-fish, sea-perch, and nipper, belongs to the same set; and also related is the large Tautog (q.v.) or Black-fish (*Tautoga onitis*). Several species of Wrasse are known as Rock-fish. The Parrot-fish (q.v.) or Parrot-wrasse is the genus Scarus.

Wrath, Cape. See Cape Wrath.

Wratza (*Vraca*), a town of Bulgaria, 43 miles NE. of Sofia. Pop. 10,924.

Wraxall, Sir Nathanael William, was born at Bristol 8th April 1751, at eighteen entered the East India Company Civil Service, but returned to England in 1772, and thereafter for nearly seven years travelled over Europe—even to Lapland, employed part of the time, however, in a confidential mission from Queen Caroline Matilda of Denmark to her brother George III. He published his *Cursory Remarks made in a Tour* in 1775, his *Memoirs of the Valois Kings* in 1777, entered parliament in 1780 as a follower of Lord North, but went over to Pitt, and was made a baronet in 1813. His next books were the *History of France from Henry III. to Louis XIV.* (3 vols. 1795), *Memoirs of the Courts of Berlin, Dresden, Warsaw, and Vienna* (2 vols. 1799), and the famous *Historical Memoirs of my own Time, from 1772 to 1784* (2 vols. 1815). For a libel in the last on Count Woronzov, Russian envoy to England, Wraxall was fined £500 and sentenced to six months imprisonment, half of which he endured. Violent attacks on his veracity were also made by the *Edinburgh*, the *Quarterly*, and the *British Critic*, but Wraxall printed *Answers*, on the whole, with success. He died at Dover, on the way to Naples, November 7, 1831. His *Memoirs*, continued from 1784 to 1790, was published in 1836 (3 vols.). There is an excellent edition of the whole work by Mr H. B. Wheatley (5 vols. 1884).

Wray, John. See Ray.

Wrecks are ships or goods cast on shore by the sea, and are usually distinguished from Derelict (q.v.) property or Flotsam (q.v.). But the Merchant Shipping Act of 1854 and subsequent amendments includes jetsam, flotsam, ligan, and derelict. Shipwrecks may fall under the category of stranding or foundering; and may be caused by storms, fire, collision, leaks (due to straining of timbers, corroding of metal sheathing, &c.), fog, shoals or rocks not marked in charts, imperfect steering-gear, and bad or careless seamanship—ignorance of the position, miscalculation, negligence as to showing ship-lights, colour-blindness, inattention to soundings, disregard of currents, the omission to make due allowance for correction of the compass, and a long list of other possibilities of error. Means of avoiding shipwreck are lighthouses, beacons, storm-signals; and lifeboats and life-preserving apparatus of all kinds diminish the fatalities.

In the time of Henry III., much as in Roman law, wrecks were the property of the crown unless the owner appeared within a year and a day to make good his claim; but a ship was not accounted a wreck legally if any living thing escaped, though even then the ship was made over to the crown after a year and a day if the owner did not compear. Now all action in regard to wrecks in Britain is under the Board of Trade, who appoint receivers of wreck—customs officers, justices of peace, &c. being held bound to act when receivers are not at hand. The receiver takes evidence as to ownership, and reports to the Board of Trade. If the owner does not appear or make good his claim, and if the lord of the manor have no right to unclaimed wreck, then after a year the receiver sells the wreck, and, deducting expenses, pays the proceeds into the exchequer. If the goods or ship are rescued by private persons, Salvage (q.v.) may be demanded. In Scotland a law of 1429 enacted that wrecked ships and their goods should escheat to the king if they were of countries where wrecks belonged to the king; if not, 'broken ships' should have the same favour in Scotland as Scottish vessels received in the countries to which the wrecks belonged.

Stealing wreck is a crime, and so is removing lights, altering them, or showing false lights so as to cause wrecks. *Wrecking*, or showing false lights, used to be a common practice in some parts of the United Kingdom—the population of the Cornish coast being specially notorious for their heartlessness in this respect; and a wreck occurring by the 'act of God' was regarded as a divine bounty to the natives of the district where it was driven ashore. The lives of the unfortunate survivors were by no means safe in the hands of wreckers who feared their booty might be taken from their grasp.

In spite of the disappearance of such barbarous usages, and the establishment of the lighthouses, lifeboats, and all manner of life-preserving apparatus on the most exposed parts of the coasts of civilised countries, the annual loss of shipping and of life by shipwreck is appalling. Mr Mulhall estimates the average tonnage of British shipping lost at 260,000 tons, as compared with 128,000 tons of United States shipping, 46,000 of German, 29,000 French, and 29,000 Italian.

In the year 1890–91 there were reported 6222 casualties at sea to vessels of all sorts belonging to the United Kingdom—3404 to sailing-vessels and 2818 to steamers; the total losses were 546, their tonnage being 208,645 tons; and of them 266 were lost through stranding, 97 through collision, and 89 through foundering. The total lives lost through sea casualties, or vessels wholly or partially lost, were 1491 crew and 590 passengers; of this last number 555 were lost in one vessel, the *Utopia*, sunk at Gibraltar. Of vessels belonging to British possessions abroad the casualties were 903, 293 (of 43,633 tons) being total losses, and the lives lost were 289, 242 seamen and 47 passengers. Of foreign vessels 600 sustained casualties on the shores of the United Kingdom or of British possessions, 118 being total losses, while 73 seamen perished. The number of casualties to ships of all sorts, British and foreign, on the coasts of the United Kingdom were 4198; total losses, 427; lives lost, 523. On the coast of the United Kingdom 2922 lives were saved from shipwreck during the year; 1698 on the coasts of British possessions abroad; 1947 from British vessels on the coasts of foreign countries;

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and 1238 from British vessels at sea (see LIFE-BOAT). In 1886–87 there were no less than 1582 vessels totally wrecked on British coasts; in 1879–80 only 355 were reported. The number of lives lost on British coasts was 1333 in the year 1867, and only 396 in 1885–86.

Formerly a wrecked ship that went to the bottom remained there until she was entombed in the shifting mud or sand, or else had undergone a process of gradual dissolution, hastened by the ebb and flow of tides and currents. Wreck-raising was then a science practically undreamt of. Sometimes crude operations were carried on at sunken wrecks (see DIVING, Vol. IV. p. 22); but the object aimed at was the recovery of treasure, and not the raising to the surface of the vessel containing it. The development of mechanical science and steam-power has placed in the hands of modern wreck-raisers machinery that has enabled them to lift many a fine ship from her oozy bed, and restore her to her proper place among the floating argosies of commerce. Most of the vessels that are raised have been the victims of collisions; and these are most frequent in the crowded waters of British harbours and their approaches. The chief economic purpose served by wreck-raising is the keeping clear the fairways leading to the large seaports. Many harbour boards have their own wreck-removing plant; when harbour commissioners do not possess the necessary plant, they advertise for tenders. Years ago the usual practice was to blow the sunken ships to pieces; but when the disaster has occurred in shallow water this is now regarded as wasteful. Between 1880 and 1892 the Thames Conservancy Board raised 399 vessels (277 of which were barges) from the river-bed. The wreck-raising plant employed included a screw-tug, three 150-ton lighters, fitted with steam-winches and steam-pumps; two 150-ton and two 300-ton lighters without steam-power; and two 400-ton lighters. A complete diving equipment is also provided, and an abundant stock of wire and other rope. When a collision takes place and a vessel sinks in the fairway of the river a wreck-boat is moored *in situ*, and the diver makes his examination. All the loose gear is removed, and a number of wire-cables are made fast. The cables are calculated to stand a tension of 150 tons, and they very seldom break. As many as twelve or fifteen cables are sometimes passed under the ship (if large), and made fast to the lighters at dead low-water. The lighters themselves are submerged as far as possible and then pumped dry; and as the tide rises the wrecked vessel leaves her bed in the mud and sand and slowly rises to the surface. Then powerful centrifugal pumps are set at work, and the wreck pumped sufficiently dry to enable her being floated away for repairs. Or 'camels'—as the lifting lighters are generally called—are attached to the cables passed under the vessel at low-water; the ship is raised from her resting-place as the tide rises; and, as the lighters float on the surface, the vessel to which they are attached is just raised the tide's height and no more. Tugs are then employed to tow the lighters and their sunken prize towards the spot selected for beaching. With the appliances possessed by the Conservancy Board ships can be raised whose weight under water does not exceed 1800 tons.

Successful examples of wreck-raising are the *Eurydice*, H.M.S. *Sultan* (sunk in Maltese waters), and the Anchor liner *Utopia* (see below) at Gibraltar. But, with all our modern scientific and mechanical knowledge, wreck-raising can only be carried on in comparatively shallow water. Diving operations can, of course, be carried on at a greater depth. Thus in the year 1885 the screw-steamer *Alfonso XII.* went down off Las Palmas in 165 feet of water, with £70,000 of specie on board, all of which was removed in safety from the bullion-room of the sunken vessel, and raised to the surface by a London firm.

Among wrecks notable for the loss of life, the sufferings of survivors, for historical and literary associations, or for the heroism of captain and crew, are the following:

Many ships of the Armada on British and Irish coasts	1588
Albion (Falconer's 'Shipwreck'), on Campeachy coast	1699
Sir C. Shovel's fleet, Scilly; 2000 lives lost	1707
Wager (Commodore Byron's ship), South Seas	1741
Grosvenor, Indiaman, South Africa	1782
Royal George, under repair at Portsmouth; 900 lives lost	1782
Pandora, frigate; 100 lives	1791
Queen Charlotte, of 110 guns, burned off Leghorn; 700 lives	1800
Abergavenny, Indiaman, on Portland Bill; 300 lives	1805
Aurora, transport, on Goodwin Sands; 300 lives	1805
Minotaur, of 74 guns, North Sea; 360 lives	1810
St George, 98 guns, Defence, 74, Jutland; 1400 lives	1811
British Queen, Goodwin Sands	1814
Medusa, French ship, Senegambia	1816
Queen Charlotte, Madras	1818
Kent, Indiaman, burned during storm, Bay Biscay; all saved	1825
Forfarshire (Grace Darling's wreck)	1838
President, lost between New York and Liverpool	1841
Reliance, Indiaman, near Boulogne; 116 lives	1842
Ocean Monarch, burned off Orme's Head; 178 lives	1848
Royal Adelaide, off Margate; 400 lives	1849
Edmund, emigrant ship, west of Ireland; 200 lives	1850
Birkenhead, troopship, South Africa; 454 lives	1852
Northern Belle, American ship, near Broadstairs	1857
Pomona, American ship, Irish coast	1859
Royal Charter, off Anglesey; 446 lives, and £750,000	1859
Lima, American ship, off French coast; 363 lives	1860
London, in Bay of Biscay; 220 lives	1866
H.M.S. Captain, off Finisterre; 472 lives	1870
Northfleet, off Dungeness; 300 lives	1873
Atlantic, off Nova Scotian coast; 560 lives	1873
Strathmore, South Indian Ocean; 45 lives	1875
H.M.S. Vanguard, rammed by consort; all saved	1875
Schiller, German packet, off Scilly Isles; 331 lives	1875
Deutschland, German steamer, off the Thames; 70 lives	1875
H.M.S. Eurydice, training-ship, off Ventnor; 300 lives	1878
Princess Alice, sunk by collision in Thames; 650 lives	1878
Grosser Kurfürst, German warship, collision; 300 lives	1878
Borussia, German ship	1879
Victoria, on Thames in Canada, upset; 700 lives	1881
Daphne, capsized at launch in Clyde; 124 lives	1883
City of Columbus, U.S. ship, off Massachusetts; 97 lives	1884
Utopia, Italian emigrants, collision, Gibraltar; 574 lives	1891
Bokhara, P. and O. liner, off Pescadores Islands; 125 lives	1892
Roumania, Anchor liner, on Portuguese coast; 113 lives	1892

See articles BEACON, DIVING, DERRICK, LIFEBOAT, LIFE-SAVING APPARATUS, LIGHTHOUSE, LLOYD'S, METEOROLOGY, PILOT, PLIMSOLL, RULE OF THE ROAD, SALVAGE, SIGNALLING; *Shipwrecks and Disasters* (Lond. 1812); Folleville, *Tragédies de la Mer* (4th ed. 1888); Trousset, *Histoire des Grands Naufrages* (1880); and for law, Murton, *Wreck Inquiries* (1884).

Wrede, KARL PHILIPP, Bavarian field-marshal and Prince (1767–1838), was born in Heidelberg, shared in the campaigns of 1799 and 1800, fighting at Hohenlinden, and as commander of the Bavarians invaded Tyrol and took part in the battle of Wagram with the French, after which he was made a count of the empire by Napoleon. He led the Bavarian troops under Napoleon to Russia in 1812; then, changing sides with his country, commanded a united Bavarian and Austrian army against the French, by whom he was defeated at Hanau. He was, however, victorious in several battles on the sacred soil of France in 1814, and was made field-marshal and prince, with the gift of large estates. He represented Bavarian interests at the Vienna Congress in 1814.

Wrekin. See SHROPSHIRE.

Wren, a genus (Troglodytes) and family (Troglodytidæ) of birds, having a slender, slightly curved, and pointed bill; the wings very short and rounded; the tail short, and carried erect; the legs slender, and rather long. Their plumage is generally dull. They are abundant in the neotropical region, less common in the nearctic, palæarctic, and parts of the oriental regions. They live on or near the ground, seeking for insects and worms amongst low bushes, and in other similar situations. The Common or European Wren (*T. parvulus, europæus,* or

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vulgaris) is found in all parts of Europe, and in Morocco and Algeria, and in Asia Minor and northern Persia. In central Asia it is represented by *T. pallidus*. In Iceland and the Faroes it is represented by *T. borealis*, and in the south-west of Norway a species has been found, known as *T. bergensis*. The common wren is more abundant in the northern than in the central and southern parts of Europe. It is a very small bird,

Wren and Nest (*Troglodytes parvulus*).

only about 3½ inches long, reddish brown above, with narrow transverse bars of dark brown, yellowish white below, the greater wing-coverts with three or four small bead-like spots of white. From its peculiarity of form, and its active, lively habits, it is one of the most familiarly known of British birds. It frequents gardens, hedges, and thickets. Its flight is not long sustained; it merely flits from bush to bush, or from one stone to another, with very rapid motion of the wings. It sometimes ascends trees, nearly in the manner of creepers. The male has a loud sweet song. The nest, which is comparatively large, is oval, domed above, with a small opening in the side, and is composed of leaves, hay or moss, sometimes lined with feathers, and generally of materials such that it resembles in colour the objects beside it, and is not easily discovered. It is often placed under the thatch of a building, under the turf of a turf-topped wall, against the side of a moss-covered tree, or under an impending bank, always so as to be sheltered from rain. The eggs are usually from six to eight in number, and the male is assiduous in his attentions to the female in supplying her with food during incubation, and afterwards assists her in the care of the young. Two broods are produced in the season. Imperfect nests, known as 'cocks' nests,' are often found near an occupied nest. In severe winter weather a number of wrens often take shelter together in an old nest, or in a hole of a wall; sometimes they roost in byres, to enjoy the warmth proceeding from the cattle. When driven from bushes, the wren is easily run down; and the hunting of the wren (the 'king of all birds') on St Stephen's or Christmas Day is an old custom in the south of Ireland. A similar custom obtained on other days in other localities. Its origin is unknown. In general, however, the wren is almost as much a popular favourite in Britain as the redbreast. The name *Kitty* or *Jenny Wren* is popularly given to it in many parts of the country. The North American species of wren are numerous; but many of them are ranked under different genera. The House Wren (*T. domesticus* or *œdon*) is larger than the European wren, being about 5 inches long. It is reddish brown above, barred with dusky, and pale fulvous white below, with a light brownish tinge across the breast. It is abundant in the eastern parts of the United States. It is less shy than the European wren, and often builds its nest near houses, and in boxes prepared for it. The nests are made to fill the boxes; and to effect this a large mass of heterogeneous materials is sometimes collected. The song of the house wren is very sweet. The male is a very bold, pugnacious bird, readily attacking birds far larger than itself, as the blue-bird and swallows, and taking possession of the boxes which they have appropriated for their nests. It even attacks cats when they approach its nest. The Winter Wren (*T. hyemalis*) is so similar to the European wren that it is not easy to state a specific difference. It is common throughout North America, from Labrador to Louisiana, and partially migratory. Several other species, common in North America, all agree very nearly in their habits with the common wren. See also GOLDEN-CRESTED WREN.

Wren, SIR CHRISTOPHER, architect, was born at East Knoyle in Wiltshire, on the 20th of October 1632. His father, Dr C. Wren, was Dean of Windsor, and his uncle, Dr M. Wren, was Bishop successively of Hereford, Norwich, and Ely. Young Wren was educated at Westminster School, under the celebrated Dr Busby, and while yet only in his fourteenth year was entered a gentleman-commoner of Wadham College, Oxford. Here he distinguished himself in mathematics, attracted notice by his inventions of certain mathematical instruments, and his enthusiasm in experimental philosophy. In 1650 he took his degree of B.A., and in 1653 that of M.A., having been previously made fellow of All Souls. In 1654 he is spoken of by Evelyn as 'that rare and early prodigy of universal science;' and acquaintance ripened into a firm friendship between Wren and Evelyn.

In 1655 Wren assisted in perfecting the barometer. In 1657 he left Oxford for London, where he became Gresham professor of Astronomy, but in May 1661 returned to Oxford as Savilian professor of Astronomy. The same year he received the degree of D.C.L., and that of LL.D. at Cambridge. Before leaving London Wren had, in conjunction with Lord Brouncker, the Hon. Robert Boyle, Dr Wilkins, and others, who used to meet together at Gresham College, laid the foundation of the future Royal Society. One of the first proceedings of the Society was to get the king to lay his commands upon Wren to perfect a design he had in hand of a globe of the moon, and to 'proceed in drawing the shapes of little animals as they appear in the microscope.' The lunar globe was finished, much to the satisfaction of his Majesty, who placed it in his cabinet of rarities. He also summoned Wren from Oxford to assist Sir John Denham with his advice on architectural subjects; the poet Denham having been appointed surveyor-general of his Majesty's buildings, but possessing little or no knowledge of the subject.

The study of architecture was one to which Wren had given great attention, notwithstanding his devotion to mathematics, astronomy, chemistry, and even anatomy. In 1663 he was engaged by the Dean and Chapter of St Paul's to make a survey of the cathedral, with a view to certain projected repairs in that vast fabric. He accordingly drew up a very careful and elaborate report, but before any steps were taken St Paul's was irreparably injured by the memorable fire of 1666, and Wren was destined to be the architect of the new cathedral instead of the restorer of the old. The first work actually built from a design by Wren was the chapel at Pembroke College, Cambridge, in 1663. But in the same year he designed the Sheldonian Theatre at Oxford (1664–69). In 1664 Wren also designed some valuable additions to the buildings at Trinity College,

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Cambridge, particularly the beautiful western quadrangle known as Nevile's Court. To this he added in 1666 the Library of Trinity College, said by Gwilt to be 'one of his finest productions, and one with which he himself was well satisfied.'

In 1665 Wren visited Paris, where he made the acquaintance of Bernini, architect of the colonnade of St Peter's, Rome, and of other distinguished men. In the following year he returned, to find the Royal Society earnestly engaged in searching out the causes of the great plague, so soon to be succeeded by the great fire which laid London in ashes. This disaster at once opened a wide field for the exertion of Wren's genius. He formed a plan and drew designs for the entire rebuilding of the metropolis, embracing wide streets, magnificent quays along the banks of the river, and other well-considered improvements. In rebuilding London, however, few of Wren's recommendations were adopted. He was certainly chosen to be the architect of new St Paul's, one of the finest non-Gothic cathedrals in the world; besides which he designed more than fifty other churches in place of those destroyed by the fire. The great church of St Paul, built on the model of St Peter's at Rome, was begun in 1675 and completed in 1710, when the last stone was laid upon the lantern by the architect's son, Christopher.

Besides the numerous churches mentioned, Wren built or designed the Royal Exchange (1667); Custom-house (1668); Temple Bar (q.v., 1670); the Monument (1671–77); the College of Physicians (1674–98); the Royal Observatory, Greenwich (1675); the Gateway Tower, Christ Church, Oxford (1681–82); Chelsea Hospital (1682–90); Ashmolean Museum, Oxford (1683); Hampton Court (q.v., 1690); Morden College, Blackheath (1692); Greenwich Hospital (1696); Buckingham House (1703); Marlborough House (1709); the western towers and the north transept, recently altered, of Westminster Abbey (1713); besides the unfinished palace of Winchester (1683). See RENAISSANCE.

In 1672 Wren received the honour of knighthood. In 1674 he married a daughter of Sir John Coghill, by whom he had a son, Christopher (1675–1747, antiquary); and in 1679 he married a daughter of Viscount Fitzwilliam, by whom he had a son and daughter. In 1680 he was elected President of the Royal Society; in 1684 was made comptroller of the works at Windsor Castle, where he built the state apartments, of which the exterior only was Gothicised by Wyatville; and in 1685 was elected Grand-master of the order of Freemasons. He was also elected a member of parliament for Windsor in 1689, and being unseated on petition was immediately re-elected. In 1698 he was appointed surveyor-general of the repairs at Westminster Abbey. Wren died at his house at Hampton Court, sitting in his chair after dinner, on 25th February 1723, aged ninety years, and was buried in St Paul's Cathedral, where the appropriate inscription, 'Si monumentum requiris, circumspice' marks his tomb. During his declining years he was treated with neglect, and even injustice, by the court of England; 'one Benson' was appointed by George I. to supersede him in the office of surveyor-general; and some private individuals carped at his works in a most malevolent spirit. Steele, however, vindicated the fame of his friend in the *Tatler*, in which Wren is introduced in the character of Nestor; and few have since been found hardy enough to call in question the well-merited reputation of Sir C. Wren as architect, mathematician, and scientific observer.

See Milman's *Annals of St Paul's* (1868), and Lives by James Elmes (1852) and Miss Phillimore (1881).

Wrestling is one of the most ancient forms of athletic exercise, and was at one time the favourite pastime of the Greeks, especially so during that period when Greece in civilisation, military knowledge, and in the cultivation of arts and sciences stood head and shoulders above all the states of the civilised world. The Olympic Games, the great festival of the Greeks, which were instituted for the exhibition of various trials of strength and skill, included races on foot, and with horses and chariots, contests in leaping, throwing, boxing, and wrestling. In the games described by Homer valuable prizes were offered, but after the seventh Olympiad a single garland of leaves of the wild olive was substituted at Olympia as the only meed of victory. One of the great objects of the old classical wrestlers was to make every attack with elegance and grace under certain laws of a most intricate nature, and the game is described by Plutarch as the hardest working form of athletics. In Devon and Cornwall wrestling on the catch-hold principle still finds favour. In Lancashire they adopt a catch-as-catch-can style; while in Cumberland and Westmorland the ancient back-hold system continues to hold its own. The Scotch have recently adopted a twofold mixture to be hereafter described; and in Ireland collar-and-elbow wrestling is the prevailing fashion. In the United States and Australia, in Germany, France, and Japan ground-wrestling, which is the most objectionable of all known methods, is the most popular. This system has been dignified by the high-sounding title of Græco-Roman wrestling. The Græco-Roman style is practically the same as the French method, and consists of a struggle on the ground until one or other of the competitors is compelled through sheer exhaustion to give in; indeed, such a contest is simply an exhibition of brute strength, and its introduction into England has done more to bring this ancient pastime into contempt than anything that has taken place in the history of the exercise during the 19th century. On commencing, the wrestlers take hold from the head and not lower than the waist, when both roll on the ground, and then the actual struggle begins. Tripping, which is the very essence of the game, is not allowed; therefore weight and strength are the only factors in the contest, which terminates when one of the combatants has been placed on both shoulders.

The Cornwall and Devon system is a perfect drawing-room entertainment in comparison with the foregoing hybrid style. The champions hailing from these two counties wrestle in strong loose linen jackets, and lay hold above the waist or by any portion of the jacket; and in order to be fairly thrown two shoulders and one hip must be on the ground, or two hips and one shoulder, and a man must be thrown flat on his back before any other portion of his body touches the earth ere a decision can be given against him. Kicking is now forbidden, and the men usually wrestle in their stocking feet, which is a great improvement on the olden method when heavy boots shod with iron were used as a means of attack and defence. The Lancashire fashion allows unlimited action. The competitors are permitted to catch hold where they please, legs included, but they must not scratch or throttle or deliberately injure one another. Here again ground-wrestling becomes a great factor in a struggle for supremacy. In fact, Lancashire wrestling so much resembles what is called the Græco-Roman style with other objectionable surroundings that it scarcely deserves to be classed among the English systems. Two shoulders on the ground constitutes a fall with fifteen minutes rest between each bout. The Cumberland and Westmorland method is probably the best-known style at the present moment, and is still popular in such arenas as those at Carlisle, Grasmere, and other wrestling resorts in the northern counties. Unfortunately the annual Cumberland and West-

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morland gatherings in London ceased, for no particular reason, in 1888, when the old wrestling society, which had existed from the year 1824, was apparently in a flourishing condition. This was one of the first noticeable signs that the ancient pastime was on the decline, and had begun to give place to the, comparatively speaking, modern games of cricket and football. It will certainly be a subject for regret if the exercise is allowed to sink into oblivion, towards which it is unfortunately drifting. In the Cumberland and Westmorland style, when both men grasp each other round the body with the left arm above and the right underneath the play commences. Neither party is allowed to break his hold until the wrestle is over, and the one who touches the ground first with any part of his body, the feet of course excepted, is deemed the loser. If both fall together it is technically termed a 'dog-fall,' and the men wrestle over again.

In the newly-adopted Scotch style of wrestling a commencement is made by taking hold in the Cumberland and Westmorland fashion with the arms round the body and the hands grasped in the well-known back-hold style. The tussle which ensues frequently lands one of the wrestlers flat on his back, and ends the contest before the struggle on the ground begins. If, however, a fair back-fall, with both shoulders down, does not result, then the bout is continued under Græco-Roman rules. In Ireland the collar-and-elbow system still holds good in a limited degree, and some years ago frequent matches took place in the Phœnix Park, and at the Curragh at Kildare. The Irish style is simplicity itself. The competitors catch hold of the elbow with one hand and the collar with the other, and neither party is allowed to let go his hold till the fall has been gained. It is in some parts called henching, but cannot be considered a satisfactory mode of deciding a contest; yet it is useful in the case of sudden and unexpected attack, as the hold is easily obtained. The Swiss again compete in a special wrestling-costume consisting of drawers, shirt, and a stout belt. A hold can be taken by the drawers alone, the shirt, or the belt, or by all at one and the same time according to the taste of the wrestler. There is no ground-wrestling, and first man down loses in Switzerland, a much to be commended system. The French and Germans have their own fashion, but they so closely resemble the Græco-Roman and Lancashire style that the difference amounts to nothing. Practically ground-wrestling is the practice in both countries, with two shoulders down to constitute a fall. The great continental event of recent years was the victory at Berlin on 25th July 1891, in the presence of 8000 spectators, of Carl Abs over Tom Cannon, who had previously defeated twenty-seven others.

Wrestling has recently become popular in Japan and India. The Japanese have adopted the Græco-Roman style, and receive handsome rewards at the conclusion of their contests. The Jap wrestlers, who are a most formidable class of men, before entering the arena adorn themselves with a certain kind of war-paint, with a huge belt round the waist and their enormous calves encased in stout leggings. The Indians, on the other hand, wrestle in bathing-costume, and in a match only contest one bout, and one shoulder on the ground is deemed a fall. Such is a summary of the different systems of wrestling now before the public. In order to make the foregoing a little more explicit, let us recapitulate the various styles touched upon, and the definitions of a fall appertaining to each. Græco-Roman, ground-wrestling, two shoulders down to constitute a fall. Cornish and Devon, no ground-wrestling, three points down, sometimes four points down as per arrangement. Lancashire, ground-wrestling, two shoulders down, any hold. Cumberland and Westmorland, no ground-wrestling, any point down. Scotch, ground-wrestling, two points, or shoulders down. Irish, first down to lose. Swiss, first down to lose. French, German, and Japanese, ground-wrestling, two shoulders down. Indian, one fall, one shoulder-blade down to constitute a fall. Ground-wrestling is unquestionably un-English, and as stated above has brought a useful and ancient pastime into disrepute. Promoters of the sport have for years endeavoured to introduce an amalgamated system on the catch-hold principle, not lower than the waist, in which the wrestler who first touches the ground shall be considered the loser, but success has not hitherto crowned their efforts.

See Litt's *Wrestliana* (Whitehaven, 1823); *Wrestling*, by the present writer, Walter Armstrong ('All England' series, 1889); Pollock and Grove, *Fencing, Boxing, and Wrestling* (Badminton Library, 1889); Blackmore's *Clara Vaughan*, for a fine description of a wrestling-match; and Léon Ville, *La Lutte Française* (1892).

Wrexham, a town of Denbighshire, called sometimes the 'metropolis of North Wales,' on an affluent of the Dee, 12 miles SSW. of Chester. Its church, destroyed by fire in 1457, and rebuilt in 1472–1520, was restored in 1866–68 at a cost of £4000, and is a fine Perpendicular structure, whose tower, 135 feet high, contains ten bells of singular sweetness, and is one of the 'Seven Wonders of Wales.' Judge Jeffreys was born close by, at Acton; and Bishop Heber wrote 'From Greenland's Icy Mountains' in the vicarage. Wrexham is situated in the heart of a mining district, and has far-famed breweries, tanneries, &c. It was incorporated in 1857, and with Denbigh (q.v.), &c. returns one member to parliament. Pop. (1851) 6717; (1891) 12,552.

Wright, Joseph, a painter, called commonly 'Wright of Derby,' was born there on 3d September 1734, the third son of 'Equity Wright,' an attorney and town-clerk. He was educated at Derby grammar-school, and at Derby he died on 29th August 1797, having passed his whole life in his native town, with the exception of three and a half years under Hudson in London (1751–54), two years in Italy (1773–75), and two at Bath (1775–77). He married in 1773 Hannah Swift (1749–90), who bore him three sons and three daughters; first exhibited in London in 1765; and was elected an A.R.A. in 1781, an R.A. in 1784—this latter honour he declined. His paintings—of which there was an exhibition at Derby in 1883—are largely portraits or portrait groups, representing not seldom effects of artificial light, as, e.g., in his well-known 'Orrery' (1766) and 'Air-pump' (1768). If inferior to Gainsborough and Reynolds, and to Romney at Romney's best, Wright of Derby stands very high among the English painters of the 18th century, being 'a master of strong effects of light and shade, gifted with fine perception of the powers of local colour, and something of a poet in landscape.' See the fine folio on him by Mr William Bemrose (1886).

Wright, Thomas, antiquary, was born near Ludlow, Shropshire, 21st August 1810, the son of a Quaker who had migrated from Bradford. From Ludlow grammar-school he proceeded to Trinity College, Cambridge, where he took his B.A. in 1834. He had already contributed to *Fraser's* and other magazines, when in 1836 he went to London, and at once commenced the career of a man of letters. In 1837 he was elected a fellow of the Society of Antiquaries, and in 1838 was one of the two founders of the Camden Society, as in 1843 of the British Archæological Association. He also took an active part in the formation of the Percy and Shakespeare

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Societies, and for each of these, from time to time, edited volumes. In 1842 he was elected a corresponding member of the French Académie des Inscriptions, and he was also a member of other learned societies on the Continent and in America. He died at Chelsea, 23d December 1877.

From 1836 onwards he published eighty-four works, including, of course, translations and works edited for societies. The following may be mentioned: *Biographia Britannica Literaria* (2 vols. 1842–46); *Essays on the Literature, Popular Superstitions, and History of England in the Middle Ages* (2 vols. 1846); *England under the House of Hanover, Illustrated from the Caricatures of the Day* (2 vols. 1848); *Narratives of Sorcery and Magic* (2 vols. 1851); *History of Ludlow* (1852); *The Celt, the Roman, and the Saxon* (1852); *History of Ireland* (3 vols. 1854); *Wanderings of an Antiquary* (1854); *Dictionary of Obsolete and Provincial English* (2 vols. 1857); *History of France* (3 vols. 1856–62); *Political Poems and Songs, from the Accession of Edward III. to that of Richard III.* (2 vols. 1859–61); *Les Cent Nouvelles Nouvelles* (2 vols. 1858), being a collection of mediæval tales from the only known manuscript of the same, discovered by Wright in the library of the Hunterian Museum, Glasgow; *Essays on Archæological Subjects* (2 vols. 1861); *History of Domestic Manners and Sentiments in England during the Middle Ages* (1861); *A History of Caricature and Grotesque in Literature and Art* (1865); *Womankind in Western Europe* (1869); *Uriconium* (1872; see WROXETER); and *Anglo-Latin Satirical Poets of the Twelfth Century* (2 vols. 1877).

Wrightia. See INDIGO.

Wrist. See HAND; and for Wrist-drop, a form of lead-poisoning, see under LEAD.

Writ, in English law, means a written order addressed to a subject in the king's name. Since the Norman Conquest writs have been freely devised and altered for many different purposes. Some are of an administrative or political nature, as, for example, the writ addressed to a returning-officer, commanding him to hold an election, and return the name of the person elected; writs of mandamus and prohibition, by which inferior courts are kept within the bounds of their jurisdiction; and the famous writ of Habeas Corpus (q.v.), by which a person who has another in custody is commanded to bring up his prisoner and to show by what authority he detains him. An action at law was formerly begun by an 'original writ' issued under the great seal; it is now begun by a writ of summons, requiring the defendant to appear and answer the plaintiff's claim. The judgment of the court is enforced by a writ of execution, as, for example, the writ of Fieri Facias (q.v.), which directs the sheriff to levy the debt by seizing the defendant's goods. See CAPIAS, CERTIORARI, ELEGIT, ERROR, MANDAMUS, NE EXEAT, SUBPŒNA, &c. Formerly the king would issue writs of execution without trial, but this abuse was taken away by the Great Charter of 1215. *De Hæretico Comburendo* was abolished under Charles II. Many of the old forms of writ have been abolished (such as Latitat, which proceeded on the legal fiction that the defendant was in hiding out of Middlesex) or rendered obsolete by modern changes in procedure, such as Scire Facias and Quo Warranto (q.v.). In the United States the several states differ considerably; thus in New York writs of Error and writs Ne Exeat have been abolished. See also SUMMONS and WARRANT.

Writer's Cramp. See CRAMP.

Writers to the Signet, an ancient society of solicitors in Scotland who formerly had the exclusive right to prepare all summonses and other writs pertaining to the supreme court of justice (see SIGNET). Under the 31 and 32 Vict. chap. 101 they have still the exclusive privilege of preparing crown writs, which include all charters, precepts, and writs from the sovereign or prince of Scotland. The office of Keeper of the Signet was in 1817 conjoined with that of Lord Clerk Register. See LIBRARY, p. 607.—*Writer* is also a term vaguely applied in Scotland to a law practitioner or his clerk.

Writing. In the article ALPHABET an account has been given of the various systems of writing, ideographic, syllabic, or alphabetic, and all existing alphabets have been traced to their origin in the Egyptian hieroglyphic picture-writing. In the articles PALÆOGRAPHY and INSCRIPTIONS the standard records, documents, and manuscripts have been catalogued, and the various 'hands' or styles of penmanship have been described, so that it is now only necessary to give an account of the materials used for writing, and of the influence of these materials in modifying or transforming the character of the several scripts.

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The chief materials on which writings have come down to us are stone, clay, metal, potsherds, wood, papyrus, leather, parchment, wax-tablets, palm-leaves, and paper. The oldest documents which we possess come from the earliest seats of civilisation, Babylonia and Egypt, and the Babylonian and Egyptian scripts begin with inscriptions on stone. The style of the cuneiform inscriptions is due to their having been written on tablets of soft clay, which have then been dried in the sun or kiln-baked. But this cuneiform writing was itself developed out of an earlier lapidary script, the linear Babylonian, so called because it is formed of lines, not wedges, as shown in the undated lapidary inscriptions from Tel-lo (Telloh), or the inscription of Sargon of Agade, who reigned about 3800 B.C. (see BABYLONIA, Vol. I. p. 633). But when the linear Babylonian had been modified owing to the use of clay, the lapidary inscriptions follow the wedge-shaped forms which arose out of the clay script. The wedge-shaped forms are believed to have been impressed on the soft clay by means of a square-headed implement, a corner of which was dinted into the clay. The great library of Nineveh consisted of clay-tablets containing Assyrian copies of older Babylonian documents, and from Babylon we have on similar tablets the records of the Egibi

Fig. 1.—A Cuneiform Clay-tablet (reduced).

banking firm, consisting of innumerable deeds relating to financial transactions, such as loans, sales, and marriage settlements. The contract tablets go back to the 24th century B.C., and come down to the time of Domitian.

The oldest inscriptions of Egypt, which may be earlier by a thousand years than any from Babylonia, are also engraved on stone; but papyrus was also used at an extremely remote period. Hence two styles arose, the hieratic for papyrus and the hieroglyphic for inscriptions. The oldest book in existence is the *Papyrus Prisse*, now at Paris. It was found in 1847, in a Theban tomb of the 11th dynasty (2500–3000 B.C.), and purports to be a copy of a much earlier treatise, composed in the time of the 5th dynasty. It is written in a bold hieratic hand, bearing little resemblance to the hieroglyphic picture-writing from which it was derived. Such remains of the literature of ancient Egypt as we possess have chiefly come to us on papyrus rolls found in Egyptian tombs. From

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Egypt the use of papyrus spread to Europe. The oldest Greek records are inscriptions on stone or metal, but we possess Greek papyri found in Egypt which date from the 2d century B.C. At Herculaneum a library consisting of some 2000 carbonised

Fig. 2.—Specimen of the Writing of the *Papyrus Prisse*.

rolls of papyrus has been discovered. It consists mainly of Greek treatises on the Epicurean philosophy, but comprises a few Latin works, among them a poem on the battle of Actium. In the 5th century the rescripts of the Imperial Chancery at Constantinople were written on papyrus; we have papyrus deeds from Ravenna dating from the 5th to the 10th century; and in the 7th century papyrus was used for the charters of the Merovingian kings in Gaul. In the 8th century, owing to the Moslem conquest of Egypt, papyrus became more difficult to procure, but it continued to be used in the Papal Chancery till the middle of the 11th century. Concurrently with the use of papyrus for deeds and rescripts, parchment, a more costly material, was largely used for books. As to the date of its invention, Pliny records the legend that Ptolemy V. (205–185 B.C.) prohibited the exportation of papyrus from Egypt, and that in consequence the books in the great library at Pergamus were written on skins specially prepared, called from the place of their origin *pergamena*, from which the word parchment is derived. Leather had previously been used, and is still employed by the Jews for the sacred rolls of the law. Parchment is leather so prepared that both sides can be used to write on. From the 4th to the 16th centuries parchment, made from the skins of sheep, goats, and calves, was the usual material for books. Vellum is merely a finer kind of parchment made from the skins of younger animals.

Paper (q.v.), made of vegetable fibre or of rags, was probably invented by the Chinese, and introduced into Europe by the Arabs in the 9th century; in the 13th century it was used in France for deeds, and in the 15th century for books. But for the invention of paper, the printing-press would have been an invention of comparatively little importance, papyrus being too frail and parchment too costly for the multiplication of printed books.

For ordinary purposes, such as letters, accounts, and the first drafts of books, the Greeks and Romans made use of wooden slabs covered with a thin coating of wax, on which the writing was scratched with a hard point of metal, wood, or ivory, which was called the *graphium* or *stilus*. The other end of the stilus was flattened into a palette, which served to efface the writing or to smooth the wax. These tablets were called *deltoi* by the Greeks, and *tabulæ* by the Romans. They were connected by rings, serving as hinges, and two or more slabs thus connected were called a caudex or codex. A codex of two leaves or slabs was called a diptych, and one of three leaves a triptych. The peculiarities of the Roman cursive hand are largely due to the employment of these wax-tablets. They were used in France till the 13th century, and then superseded by paper.

Papyrus MSS. are, as a rule, written only on one side, and are usually found in the form of cylindrical rolls. Our word 'volume' is derived from the Latin name *volumen*, which was given to these rolls. When parchment came into use, we have also the word *rotulus*, whence the name of the Master of the Rolls, who was *custos rotulorum*, the keeper of the rolls or legal documents of the Chancery. The Greeks called these rolls *biblia*, whence the name of the Bible, and the word *bibliotheca* for a library. When the work was in several rolls the rolls were called *tomoi* (Gr., 'slices,' 'sections'), whence the word 'tome.' The Latin word *liber*, 'a book,' whence our 'library,' points to the use of the bark of trees as the material for writing, while 'book,' from the A.S. *bóc*, 'a beech tree,' points to the fact that the runes were cut on slabs of beech-wood. The book form

Fig. 3.—Latin Wax-tablet, 2d century (reduced).

was adopted for literary works written on parchment, and the name codex, originally given to the hinged sets of wax-tablets, was transferred to such MSS., distinguishing them from the *volumina* and *rotuli*. Codices written on papyrus are rare, the material being so fragile that it was liable to tear in turning over the leaves. There is, however, at Paris a papyrus codex of the 6th century, containing the sermons of St Avitus, Bishop of Vienne, and another of nearly the same date, containing some of the works of St Augustine. At Milan there is a papyrus codex of the 7th or 8th century, containing a Latin translation of Josephus by Rufinus. Before the 15th century MSS. are not paged, but only foliated—i.e. only the leaves or quires, and not the pages, are numbered. Till the 11th century the lines for the writing are scratched with a dry-point, in the 13th they are ruled with a plummet or lead point, or with red ink.

In Egypt great numbers of graffiti or inscribed

Fig. 4.—Fragment of an Egyptian Ostracon.

potsherds, called *ostraca* (lit. oyster shells), have been found. Sometimes the writing is scratched with a sharp point, but is more commonly written in ink with a reed. Some of these *ostraca* are

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have gone round with donkeys laden with potsherds in order to give these receipts. We have also Graffiti (q. v.) rudely scribbled on the plaster of Pompeian and Roman walls, which are valuable as disclosing the popular spelling and the cursive hand of the period.

Documents intended for preservation, if not inscribed on stone, were usually engraved on metal. The questions addressed to oracles were scratched on leaden plates, of which great numbers have been found, and leaden plates, containing the name of the deceased, were used as scrolls for *loculi* in tombs. Treaties between Greek states were frequently engraved on bronze plates and affixed to the walls of temples.

The oldest specimens of Indian writing are the rock inscriptions of Asoka (q.v.), which date from the 3d century B.C. These are succeeded by numerous inscriptions from Buddhist caves. The grants of land to temples were commonly engraved on copper plates. But the characteristic Indian material was the palm-leaf, the use of which has profoundly modified the scripts of Southern India, Orissa, Ceylon, and Burma. The palm-leaves were strung together something in the manner of a rosary, by a cord passing through holes bored in the leaves. The Devanagari, or Sanskrit Book-hand (fig. 5), was written on palm-leaves with a

ईश्वर इत्थं जगद्दयत यत् स्वमद्वितीयं
तनयं प्राददात यतो यः कश्चित् तस्मिन्
विश्वसिष्यति सोऽविनाश्यः सन् अनन्तायुः
प्राप्स्यति।

Fig. 5.—St John, iii. 16, in Sanskrit (the Devanagari character), as printed by the British and Foreign Bible Society.

reed and ink, but exhibits characteristic forms due to the earlier employment of a dry point, the connecting line from which the letters depend being in this case necessarily absent.

The reed, called *calamus*, *fistula*, *arundo*, or *canna*, and cut like our quill-pens, was used for writing with ink on papyrus or parchment. It is still employed in the East, and in the West continued to be used till the 12th century. Isidore of Seville, who wrote in the 7th century, is the first to mention the quill—*penna*, 'a feather,' whence our word 'pen.' In the 13th century the quill had replaced the reed, and the result of the change is seen in the adoption of finer up-strokes. The general use of steel pens has had considerable effect on modern scripts, but metal pens, or calami made of bronze, were not unknown to the ancients. The last innovation is the stylographic pen, the use of which is modifying modern hands.

Ink was usually black. The oldest inks were thick and glutinous, necessitating the use of a brush, as in the earlier hieratic writing, and in Chinese or square Pali. A thinner ink, suited for the reed, was made from gall-nuts and sulphate of iron (see INK). Red and blue ink were used for titles or initials. From the 6th to the 11th century coloured inks are rare, but in the 12th they become more common. For an account of gold and silver writing on purple parchment, see ILLUMINATION.

Among Aryan nations the writing is horizontal, and the normal direction from left to right. The Semitic scripts, on the other hand, are written from right to left, this being the direction of the early hieratic, from which the Phœnician alphabet

Turkish, Afghan, and Hindustani, retain this direction. The oldest of the Greek inscriptions follow the Phœnician direction, but at an early period they are occasionally written in a snake-like form, following the margin of the stone. In the 6th century, or even earlier, we find them written *boustrophedon* or 'plough-wise,' the lines running alternately from right to left, and from left to right, just as oxen, when ploughing, draw the alternate furrows in opposite directions. Finally all the lines were written from left to right. The same happened in Italy. The older inscriptions are retrograde, a direction long retained by the Etruscans, while from Cumæ we have boustrophedon inscriptions, until finally the direction from left to right was adopted. The same was the case with the runic writing, which was obtained from the Greeks before the direction of the writing had been changed. The earliest runic inscriptions are retrograde, then they become serpentine or boustrophedon, and finally they are written from left to right. The Himyaritic inscriptions from Arabia Felix are retrograde, boustrophedon, or from left to right, a direction which was adopted when the Himyaritic writing penetrated to India. Hence the Devanagari, the Pali, and all the derived Indian scripts are written from left to right. Chinese is written in vertical columns, beginning with a column on the right-hand side of the paper. The Manchu and Mongolian scripts are also written in vertical columns, but, unlike the Chinese, they begin on the left-hand side of the paper. The Mongolian, from which the Manchu was derived, was obtained from the Syriac script of the Nestorian missionaries, who at first wrote from right to left, and then for convenience wrote vertically, the paper being turned round through 90° to enable it to be read. Finally it was both written and read vertically.

The character and general appearance of scripts has been greatly influenced by the nature of the materials employed, whether stone, clay, metal, wood, papyrus, wax, palm-leaves, parchment, or paper, and also by the implement, whether chisel, brush, reed, stile, or quill, as well as by the quality of the ink. Scripts of wholly different origin, if written with the same materials, acquire a general external resemblance. If a brush, with thick glutinous ink be employed, the writing tends to become upright, thick, and bold, as in Chinese, Siamese, Square Pali, and the hieratic of the old Egyptian empire. If a reed be used the writing often slopes to the left, the up-strokes and down-strokes being of the same thickness, as with a stylographic pen. On the other hand, with a quill or a steel pen the writing slopes to the right, and the up-strokes are fine. Thus it is manifest that our printed capitals, such as W, M, N, or V, are imitations of quill-written letters, the down-strokes being thicker than the up-strokes. With a lapidary script the strokes are all of the same thickness, the letters are square, angular, upright, and regularly formed, eschewing oval loops or sweeping tails. Thus lapidary Greek and lapidary Himyaritic have a superficial resemblance, though their pedigrees are different. A xylographic script, such as the runic writing, is rectilinear and regular, like a lapidary script, but triangles are preferred to squares, complicated forms disappear, curves and horizontal lines are avoided, diagonals running obliquely across the grain of the wood being preferred. Hence in the runic writing H becomes N, the bars of F slope upwards, and those of E

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slope downwards (see RUNES). A palm-leaf script, if scratched with a point, and not written with a reed, prefers arcs of circles and vertical lines, lending itself readily to intricate convolutions, but like a xylographic script it rigorously eschews horizontal lines, which would cause the leaf to split. Palm-leaf scripts, such as those of Orissa, Ceylon, and Burma, have a superficial resemblance, though their pedigrees may differ. On metal, if the writing be punched, it partakes of lapidary forms; if written with a point it becomes scratchy, and we get intersecting lines, the angles are not joined with precision, and circles become irregular ovals. On clay the loops are opened, all the forms are rectilinear, and the strokes become parallel and detached. Books written on parchment, a costly material, exhibit an elaborate caligraphic style, the letters being upright, separately formed, regular in size, with symmetrical curves, elliptical rather than circular curves being preferred. The up-strokes are

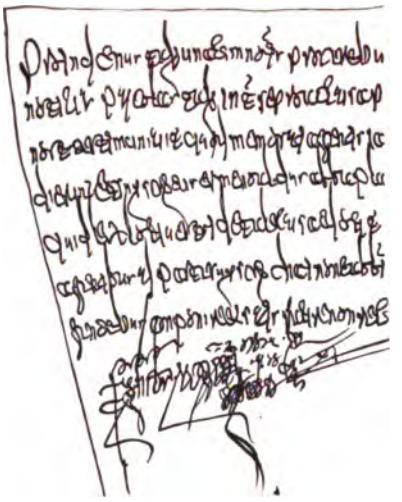

Fig. 6.—Merovingian Script, 7th century. Portion of a Charter of Clovis III. (reduced).

fine, and the down-strokes of uniform thickness. But if a rough and cheap material, such as papyrus or paper, be employed, the writing tends to become careless and cursive, easily degenerating into an almost illegible scrawl, as in the Merovingian charters, exhibiting blotted loops and elongated tails, the letters being joined by ligatures which have a tendency to modify the forms of the letters. Thus A is a lapidary form, a is a parchment form, while *a* is a paper form. The same characteristics are exhibited by M, m, and *m*; G, g, and *g*; B, b, and *b*; and by most of the other *f* letters.

Assimilation also produces superficial resemblances, especially between contiguous letters, such as E and F, M and N, m and n, p and q. The effects of dissimilation have also to be reckoned with. Thus when r took the form *r* the resemblance to the written *z* became a source of confusion, and the latter letter acquired a tail and became *z*. So the oldest forms of the letters b, d, and *r*, which consisted of a triangle with a tail, were almost undistinguishable, and, the triangle having become a loop, from a common form resembling P three differentiated forms arose, the letter B acquiring a lower loop, the letter D losing its tail, and the letter R acquiring a second tail, so that B, D, and R are now perfectly distinct.

The history of writing exhibits a constant process of decay and regeneration. Careful book-hands degenerate into illegible cursive scripts, and then new book-hands are gradually developed, which again degenerate. There is a constant struggle between two principles—the principle of least effort, which tends to render writing illegible, and the need of being legible, which tends to regeneration. Thus the beautiful uncial book-hands gave place to the illegible Greek and Roman cursives, and out of these cursives the new minuscules were evolved, which again degenerated into almost illegible cursives. Fashions in writing vary with time and place. Some of the distinctive national hands are described in article PALÆOGRAPHY, pp. 705, 706.

See books cited at ALPHABET, INSCRIPTIONS, and PALÆOGRAPHY; the articles CUNEIFORM, HIEROGLYPHICS, QUIPU, SHORTHAND; the articles on A, B, C, and the other letters of the alphabet; and specimens at ARABIA, ARMENIA, BURMA, CHINA, ETHIOPIC, HEBREW, IRELAND (p. 208), MOABITE STONE, &c.

Writing-machines. See TYPE-WRITER.

Wroxeter, a village of Shropshire (pop. 500), on the Severn, 6 miles SE. of Shrewsbury. It occupies the site of the Roman station of *Uriconium*, an important place on the great north-western Roman road now known as Watling Street. At Uriconium part of the wall (once 3 miles in circumference) with ditch and rampart still exists, and the place has yielded many and various Roman remains, excavations having been carried on during 1859–67. See T. Wright, *Uriconium* (1872).

Wryneck (*Yunx*), a genus of birds of the Woodpecker family (Picidæ), having a short, straight, conical beak; a long extensile tongue, with a horny point; wings of moderate size; a rather short and rounded tail; the feet with two toes in front and two behind. One species, the Common Wryneck (*Y. torquilla*), is a regular spring visitor to England and the north of Europe.

Wryneck (*Yunx torquilla*).

From its appearing at the same time with the cuckoo, it has acquired the name of *Cuckoo's Mate*, or *Cuckoo's Leader*. It has been found as far north as Caithness, the Orkneys and Shetlands, and the Faroes. It has also been found in Ireland. It is about 7 inches long, of a rusty ash colour, irregularly spotted with brown and black. It feeds on caterpillars and insects, and is often seen on the ground near ant-hills, feeding on the ants and their 'eggs.' The construction of its tongue resembles that of woodpeckers, and enables it to seize its insect prey with wonderful celerity; the tongue, which is covered with a glutinous secretion, is darted out and retracted so that the eye can scarcely follow it, the two posterior branches of the bones of the tongue being much elongated, and muscles for its extension attached to them.

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The wryneck generally makes almost no nest, but deposits its eggs on fragments of decayed wood in a hole of a tree. The young birds are easily tamed, and are great favourites with boys. In France boys tie a string to one of the legs of the bird, and allow it to climb trees in search of insects. The name wryneck is derived from the bird's habit of writhing its head and neck quickly in various directions, with an undulating snake-like motion, which it does particularly if found in its hole in a tree, making at the same time a hissing noise, to alarm the intruder; but on his drawing back it suddenly darts out and escapes.

Wu-chang. See HANKOW.

Wudwan (*Wadhwán*), a native state in the Indian division of Kathiawar. Area, 237 sq. m.; pop. nearly 50,000, mostly Mohammedans. The capital, Wudwan, 110 miles NW. of Baroda by rail, has some trade and a pop. of 17,000.

Wu-hu, a Chinese treaty port in An-hui, near the Yang-tsze, 50 miles above Nanking; pop. 72,000.

Wullenwever. See LÜBECK.

Wulstan, or WULFSTAN, (1) a monk of Winchester in the 10th century, author of a Latin prose life of Bishop Ethelwold, and a poem in Latin hexameters on the Miracles of St Swithin.—(2) An Archbishop of York, in 1003, author of two pastoral letters and several homilies in Anglo-Saxon, the most remarkable of which is printed in Hickes's *Thesaurus*, vol. iii. See *Ueber die Werke des altengl. Erzbischofs Wulfstan* (Weimar, 1882), by Prof. A. Napier, who has also edited the Homilies (Berlin, 1883).—(3) The well-known Bishop of Worcester, and a saint of the English calendar. He was born at Icentun in Warwickshire about 1007, and educated at Evesham and Peterborough. He became a priest, afterwards a monk and prior of the monastery of Worcester, and ultimately in 1062 bishop of that see. He lived through the troubles of the Norman Conquest, enjoyed the favour not only of the Conqueror, but of William Rufus, and died in 1095, at the age of eighty-seven. He is by some reputed the author of the portion of the Anglo-Saxon Chronicle which extends from 1034 to the death of the Conqueror. His Life was written by William of Malmesbury (Wharton's *Anglia Sacra*, vol. ii.).

Wundt, WILHELM MAX, physiologist and philosopher, was born 16th August 1832 at Neckarau in Baden, and, after lecturing at Heidelberg and Zurich, went to Leipzig in 1875 as professor of Physiology. He is distinguished in the field of experimental psychology, and has written a long series of works on the nerves and the senses, the relations of physiology and psychology, logic, &c.

Wupper, or WIPPER, a tributary of the Rhine, which enters on the right bank between Cologne and Düsseldorf. The river, about 40 miles in length, has a strong current, and is used as motive power by hundreds of mills, so that the Wupperthal, especially that part of it which contains the towns of Barmen (q.v.) and Elberfeld (q.v.), is one of the most populous and industrial in Germany. The religious zeal of the inhabitants, and their interest in missions, are conspicuous.

Würtemberg, a kingdom of Germany, lying between Baden on the west and Bavaria on the east, and touching Switzerland (Lake of Constance) on the south. It entirely surrounds Hohenzollern, in which state, as well as in Baden, it owns several detached portions of territory. Area, 7529 sq. m. (a little larger than Wales); pop., which is nearly stationary, 2,035,443 in 1890. Chief town, Stuttgart (q.v.); Ulm, Heilbronn, Esslingen, and Cannstatt have each more than 20,000 inhabitants. The Black Forest, rising to 3776 feet, lies along its western boundary; whilst the Swabian Alb (3327 feet) stretches right across the country from west to east, forming the watershed between the Neckar and the Danube, the principal rivers of the kingdom; the northern portions belong to the Bavarian plateau. Mineral springs are plentiful. The numerous fertile valleys, favoured by a genial and temperate climate, produce wine and fruit in abundance. The breeding of live-stock is of more than average importance, 18½ per cent. of the area being grass and meadows. Forests occupy some 31 per cent. of the area. Iron, salt, and turf are extracted. The industries, varied and extensive, employ 41 per cent. of the population, the more notable branches being gold and silver work, hardware, iron-casting, machinery, philosophical and musical instruments, watches, bricks, chemicals, toys, printing and publishing, paper, tanning, brewing, silk and wool spinning, embroidery, &c. The country has for many ages been noted for its high educational standard. The national university is at Tübingen; Stuttgart is the seat of an excellent polytechnic, Hohenheim of an agricultural academy. Of the total population 68 per cent. are Protestants.

The hereditary sovereign is assisted by two houses of parliament, one an assembly of princes and the heads of certain noble families; the other consisting of twenty-three privileged members and seventy elected directly by the people for a period of six years. The national income and expenditure balance at about £4,220,000 per annum; the national debt amounts to £28,000,000, nearly all incurred for building railways. Famous Würtembergers were Schiller, Uhland, Wieland, Hauff, Kerner, Œcolampadius, Schelling, Hegel, Baur, Strauss, Kepler, Dannecker, &c.

Würtemberg, then occupied by the Suevi, was conquered in the 1st century by the Romans. In the 3d century it was overrun by the Alemanni, who in their turn were subdued by the Franks. The Frankish emperors included part of their territories in the Duchy of Swabia, and eventually, in or before the 13th century, conferred upon a local family the dignity of Counts of Würtemberg. Count Eberhard the Illustrious (1279–1325) greatly extended the possessions and power of the family, and made Stuttgart his principal residence. Eberhard II. (1344–92) waged a long and finally successful feud against the towns of the Swabian league. From 1442 to 1482 the county was divided between two branches of the family; but in 1495 Count Eberhard V. (1480–96) was created a duke of the empire. Ulrich (1498–1552), who began to rule when only sixteen, is perhaps the best known of the dukes: his extravagance and love of display occasioned the 'Poor Conrad' peasant revolt (1514); he caused Ulrich von Hutten's cousin to be slain, whereby he roused a host of enemies—the knightly orders of the empire, the Bavarian dukes, the towns of the Swabian league, and the emperor. The ban of the empire being proclaimed against him, he was driven into exile. On his return he introduced the Reformation into his duchy; and the policy thus begun was energetically furthered by Ulrich's son Christopher (1550–68), who was likewise the author of important legislative reforms. During 1547–99 Würtemberg was constrained to rank as a fief of the Austrian royal house. Though it took no direct part in the Thirty Years' War until 1634, the country suffered very greatly from the various hostile armies, especially the Imperialists, and it took all the energy and statecraft of Duke Eberhard III. (1628–74) to repair the damages and recuperate the resources of his country. Under Eberhard Ludwig (1677–1733) the French, in repeated invasions, helped the mistresses of the extravagant duke to impoverish the land anew; nor did his

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cousin and successor do anything to improve its condition. Karl Eugen (1737–93), the next duke, aped Louis XIV., built castles, waged war against Frederick the Great, violated the constitution by arbitrary acts, but did much in his later years to foster education and science. Frederick II. (1797–1816) brought upon himself the vengeance of Moreau in 1800, but on going over to the French was rewarded with 850 sq. m. of new territory and an addition of 125,000 subjects, as well as the dignity of Elector. In the war that Napoleon began against Austria in 1805 the Elector of Würtemberg threw in his lot with the French, and his troops fought on that side down to 1813; in return for which he acquired the kingly title and an increase of territory that more than doubled the number of his subjects. The reign of the next sovereign, King William I. (1816–64), was chiefly occupied with the reorganisation of the new state and in the political conflicts that grew out of the democratic movements of 1848–49. Throwing in her lot with Austria in 1866, Würtemberg was beaten at Königgrätz and Tauberbischofsheim, and her king (Charles, 1864–91) compelled to purchase peace from Prussia at the cost of an indemnity of £800,000. The successes of 1870–71 against the French called forth a more friendly feeling towards Prussia, and led to Würtemberg's incorporation in the new German empire.

See the official *Das Königreich Württemberg* (3 vols. 1882–86); and P. Stälin, *Geschichte Württembergs* (1882 *et seq.*).

Wurtz, CHARLES ADOLPHE (1817–84), a great French chemist, a native of Strasburg, from 1844 a resident in Paris. He is author of numerous works on chemistry, of which *The Atomic Theory* (1880) and *Modern Chemistry* (by Greene, Philadelphia, 1879; 4th ed. 1885) have been translated into English. See his Life by Gautier (Paris, 1884).

Würzburg, capital of the Bavarian province of Lower Franconia, in a beautiful valley on both sides of the Main, 70 miles SE. of Frankfort by rail. Among the public buildings the most distinguished are the Episcopal Palace (1720–44), one of the most magnificent royal residences in Germany, and the spacious and excellently fitted-up Julius Hospital (1576), the university buildings, the town-hall, &c. The fortress of Marienberg, built on the site where Drusus founded a castle, is situated on a hill 400 feet high, on the left bank of the Main, and was till 1720 the episcopal residence. Of the numerous churches the most worthy of notice are the richly decorated cathedral, which was rebuilt in the 11th and following centuries, with beautiful chapels and monuments of the bishops; the Marien-kapelle, one of the most beautiful monuments of old German art, with fourteen statues of the 15th century; the university church; and the Neumünster Church, containing the bones of the patron saint of Würzburg, St Kilian, and of Walther von der Vogelweide. In front of the Julius Hospital there is a bronze statue of the founder, Bishop Julius, who also in 1582 founded the university (an older one dating from 1403 having had but a short existence). The hospital was put in connection with the university, which has all along kept the medical faculty in high reputation, and promoted the prosperity of the university as a whole. There are 75 professors and teachers and 1500 students—more than half of them medical students. The library has above 100,000 vols. There are also a notable musical school, Catholic seminaries, &c. There are manufactures of tobacco, furniture, machinery, surgical and scientific instruments, railway carriages, lamps, vinegar, wine, beer, and iron. Pop. (1880) 51,014; (1890) 60,844.

Würzburg (Lat. *Wirceburgum*) was long the capital of a sovereign bishopric of the German empire, founded in 741 by St Boniface, whose bishops held the title of Dukes of Franconia, though in spiritual matters they were under the Archbishop of Mainz. The area of the bishopric was upwards of 1800 sq. m., with a pop. of 250,000. At the peace of Lunéville (1801) the bishopric, like the other spiritual principalities of Germany, was secularised; and in 1803 the greater part of it was conferred on the Elector of Bavaria. In 1805 Bavaria gave up Würzburg to the Grand-duke Ferdinand of Tuscany, and the principality was raised to the dignity of an electorate. But at the Vienna Congress it reverted to Bavaria. The campaign of the Prussian army of the Main ended with an action here in 1866, the fortress being bombarded; and since then Würzburg no longer ranks as a fortified place.

There are guidebooks by Heffner (1871) and Hubert (1882), and contributions to the history of the town and university by Scharold (1819), Oegg (1881), Urlichs (1878), Wegele (1882), and Cronthal (1888).

Würzen, a town of Saxony, on the Mulde, 18 miles E. of Leipzig by rail, with a 12th-century cathedral, an old castle, and manufactures of biscuits, carpets, felt, cigars, wire, &c. Pop. 12,006.

Wuttke, HEINRICH, historian, born at Brieg in Silesia, February 12, 1818, became professor at Leipzig in 1848. He also took an active interest in politics, and had to the last a bitter enmity to Prussia. He died at Leipzig, 14th June 1876. Besides books devoted to the history of Silesia (1842–43, and 1847), the three years of war, 1756–58 (1856), Poland and Germany (1847), the battle of Leipzig (1863), William of Orange (1864), he began a great work on the history of writing, of which unhappily he only lived to publish the first volume, *Entstehung der Schrift* (1872). In 1879 appeared *Zur Vorgeschichte der Bartholomäusnacht*.

Wuttke, KARL FRIEDRICH ADOLF, theologian, was born at Breslau, 10th November 1819, became a university lecturer there in 1848, was called to be professor extra-ordinary at Berlin in 1854, ordinary at Halle in 1861, and died there, 12th April 1870. His chief work is his *Handbuch der Christlichen Sittenlehre* (1860–62; Eng. trans. 2 vols. New York, 1873). Other books are *Die Geschichte des Heidenthums* (1852–53) and *Der Deutsche Volksaberglaube der Gegenwart* (1865). In political things his motto was, 'A Christian cannot be a Democrat; a Democrat cannot be a Christian.'

Wyandots, a tribe of American Indians, related to the Iroquois, by whom they were nearly exterminated, the remnant emigrating to the country around Lake Superior. They gathered at Mackinaw in 1670, under the care of Père Marquette, furnished 400 warriors to the English in 1812, afterwards settled in Ohio, and in 1832, by a treaty with the United States government, removed to Kansas, where in 1855 many became citizens, a few only removing to Indian Territory.

Wyatt, JAMES, architect, was born in Staffordshire in 1746, studied some time in Rome, and succeeded Sir W. Chambers in 1796 as surveyor to the Board of Works. He built the fantastic pile of Fonthill Abbey for Beckford, and was killed by a carriage accident, 5th September 1813.

Wyatt, SIR MATHEW DIGBY, architect, was born in 1820 at Rowde near Devizes. After studying at the Royal Academy, he made a diligent study of the architecture of Italy, France, and Germany, returning to England in 1846 to publish his *Geometrical Mosaics of the Middle Ages* (1848). As secretary to the Royal Commissioners he took an important part in the arrangements of the 1851

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Exhibition. In 1856 he was appointed architect to the East India Company, in 1866 awarded the royal gold medal of the Royal Institute of British Architects, and in 1869 knighted and chosen Slade professor of Fine Arts at Cambridge. He died 21st May 1877.

His chief books are *Metal Work and its Artistic Design* (1852), *Industrial Arts of the Nineteenth Century* (1853), *Art Treasures of the United Kingdom* (1857), *Fine Art* (1870), *Architect's Handbook in Spain* (1872).

Wyatt, RICHARD, sculptor, born in London 3d May 1795, became pupil of Charles Rossi, was afterwards a student of the Royal Academy, next studied at Paris under Bosio, and in 1821 went to Rome to the studio of Canova, where Gibson was a fellow-student, and where he died, 29th May 1850. His favourite subjects were classical and poetical. His figures always show excellent modelling, especially his female figures, whose grace and beauty are beyond all praise.

Wyatt, SIR THOMAS, courtier and poet, was born in 1503 at Allington Castle in Kent, son of Sir Henry Wyatt, who stood high in favour with Henry VII., and later with his son. In 1515 he was entered at St John's College, Cambridge, where in due time he took his degrees of Bachelor and Master of Arts. He was warmly received at court, for he was one of the most accomplished men of his day, of a noble presence and fine manners, dexterous and subtle in the management of affairs, yet of spotless honour and integrity. In 1536 he was knighted, and the next year he was made high sheriff of Kent. He contrived to retain the hazardous favour of the king, and was frequently employed by him in positions of trust, as in missions to Spain, to the imperial court. In 1541 he was rewarded with a grant of lands at Lambeth, and the year after he was named high steward of the king's manor at Maidstone. He had now very much withdrawn himself from public life, and lived for the most part retired at Allington. On the 11th October 1542 he died of fever at Sherborne. Among the other accomplishments of Wyatt was that of verse, which he seems to have begun to cultivate early, and continued through life to practise. During his life he had acquired considerable reputation as a poet; and in 1557 his poems, along with those of Surrey, were published in *Tottel's Miscellany* (ed. by Arber, 1870). As marking a stage in the progress of our early literature they hold a permanent place. His love poetry is somewhat overrun with conceits derived from the study of Italian models; but some of the shorter pieces are models of grace and elegance. His satires also possess considerable merit.

His poems, together with those of Surrey, were edited by Dr G. F. Nott (2 vols. 4to, 1815–16), and there is an American edition (Bourbon, 1889), whose editor seeks to show that Anne Boleyn was the object of Wyatt's love. See also a monograph by Rudolf Alscher (Vienna, 1886).

Wyatt, SIR THOMAS, surnamed the Younger, to distinguish him from the preceding, of whom he was the only son, was born about 1520. After a wild and riotous youth, he raised a body of men at his own expense, and did good service at the siege of Landrecies (1544), displaying considerable military talent; and he continued in honourable service on the Continent till 1550. In 1554, when the Spanish match was in agitation, Wyatt, in co-operation with Lady Jane Grey's father, led the Kentish men to Southwark, after gaining considerable successes over the royalists; but failing to capture Ludgate, he became separated from the main body of his followers, and was taken prisoner, and soon after executed, 11th April 1554.

Wyborg. See VIBORG.

Wych Elm. See ELM; also WITCH-HAZEL.

Wycherley, WILLIAM, was the eldest son of Daniel Wycherley, a Shropshire gentleman of good family and some property, and was born in the village of Clive, near Shrewsbury, about the year 1640. In early youth he was sent to France, where he was admitted to the circle of the Précieuses of which the celebrated Duchess de Montausier, the beautiful daughter of Madame de Rambouillet, was queen. The duchess is said to have gained over young Wycherley to the Roman Catholic faith, but on returning to England and becoming a fellow-commoner of Queen's College, Oxford, he was reconverted to Protestantism by Dr (afterwards Bishop) Barlow. He left college without taking a degree and entered at the Middle Temple, where he acquired as much legal knowledge as sufficed for the happy portrayal of a litigious widow in his comedy of *The Plain Dealer*. For some years he lived gaily as a man about town and a courtier, and he began early to work as a dramatic author, but the dates at which his comedies were written are uncertain. 'The chronology of Wycherley's plays,' says Pope, 'I am well acquainted with, for he told it me over and over. *Love in a Wood* he wrote when he was but nineteen; *The Gentleman Dancing-master* at twenty-one; *The Plain Dealer* at twenty-five; and *The Country Wife* at one- or two-and-thirty.' If this statement be correct, the plays must have been written about the years 1659, 1661, 1665, and 1671. They abound, however, in allusions which could not possibly have been made in these years, and they must either have been in a great measure rewritten after the dates given by Pope, or more probably Pope was in error regarding them. The question, however, is one of no great moment. *Love in a Wood, or St James's Park*, a brisk comedy of hide-and-seek, founded on Sir Charles Sedley's *Mulberry Garden*, was acted with much applause in 1672, and its handsome witty author became for a time one of the most popular men in town. He rose into special favour with 'her graceless grace,' the Duchess of Cleveland, with the Duke of Buckingham, and with the king. The duchess, according to Voltaire, used to visit him in his chambers at the Temple, 'dressed like a country-maid, in a straw hat, with pattens on, and a box or basket in her hand;' Buckingham gave him a commission in a regiment; and Charles went to see him while he lay fever-stricken in Bow Street, made him a present of £500, and at one time wished to appoint him tutor to his son, the Duke of Richmond. Wycherley served for a short time in the fleet, like Dorset and many other young men of rank and fashion of that day, and was present at a sea-fight which may have been the battle gained by the Duke of York over Opdam in 1665, but was more probably one of the drawn battles fought between Rupert and De Ruyter in 1673. *The Gentleman Dancing-master*, a cleverly constructed farcical comedy of intrigue, was produced in 1673. *The Country Wife*, Wycherley's coarsest but strongest play, partly founded on Molière's *École des Femmes*, was brought out in 1675, and was followed in 1677 by *The Plain Dealer*, founded partly on Molière's *Misanthrope*. A little after 1679—the date is uncertain—Wycherley married the Countess of Drogheda, a young and handsome widow, with whom he lived unhappily, though his wife appears to have been sincerely attached to him. At her death she left him all her fortune, a bequest which involved him in a law-suit whereby he was reduced to poverty and then cast into the Fleet prison. There the ex-favourite of Charles remained for some years, while his comedies were being repeatedly performed to delighted audiences. At last James II. happened to witness a representation of *The Plain Dealer*, and was so impressed

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by the character of the hero, the surly sea-captain, Manly, that he set free the author by paying his debts, and awarded him a pension of £200 a year. At the age of sixty-four Wycherley made the acquaintance of Pope, then a youth of sixteen, who for a time paid court to him assiduously, and to whom he entrusted the revision of a number of his verses. Pope set about the task in a manner better calculated to improve the lines than gratify their author, the natural result being a quarrel, followed by expressions of esteem on both sides, but by no renewal of intimacy. Wycherley's money troubles continued to the end of his days, even his succession to his estate failing to set him completely free. At the age of seventy-five he married a young woman, in the hope that he could thereby make certain legal arrangements which would balk the hopes of his heir, a nephew whom he disliked. He died eleven days after his marriage, in December 1715, and was buried in the vault of Covent Garden church. According to Pope, he died in the Roman Catholic faith. Leigh Hunt was very probably right in saying that Wycherley was a better man than he seems in his printed works. In his lifetime he was highly spoken of for his sincerity and goodness of heart, and was known among his associates as 'Manly Wycherley'—a title of which he certainly showed himself worthy by his courageous adherence to the Duke of Buckingham when that noble had fallen into disgrace with the king.

Few writers have been at once so unsparingly condemned and so highly praised as Wycherley. Macaulay pronounced him worthless alike as a man and as a dramatist—Wycherley it must be remembered was a pensioner of James II.—while Sir Walter Scott praised his 'strong and forcible painting,' set his *Plain Dealer* in some respects above Molière's *Misanthrope*, and declared that he stood aloof from the other dramatists of the Restoration in that he upheld the standard of the Jonsonian school. *The Way of the World*, says Mr Swinburne, is one of the glories, *The Country Wife*, one of the disgraces of English literature. *The Country Wife*, says Hazlitt, will do its author never-ceasing honour. The play, in truth, excites alternate admiration and disgust. The hero is an outrage at once on decency and probability, but the heroine is a triumph. In literary brilliance Congreve of course infinitely outshines Wycherley, but Wycherley is a far more dexterous playwright. He does not sacrifice action to epigram, he never confounds the closet with the stage. There are scenes in *The Country Wife* where it would be hard to overpraise the ingenious, startling turns of the plot, the natural evolution of the situations, the irresistible bustle and rattle of the action. Purged of the imbecile nastiness with which it is defiled, it has proved one of the best acting plays ever set on the stage. Wycherley's style is vigorous and pointed, though it lacks the raciness of Vanbrugh's and the ease and dash of Farquhar's, no less than the exquisite modish grace of Congreve's. There is a curious strain of inconsistency in his work which marks it off from the work of the other Restoration dramatists. If he sins more grossly alike against morality and art than Congreve or Vanbrugh or Farquhar, his work nevertheless betrays an earnestness of purpose, a sincere and even morose indignation against certain forms of vice, of which there is no sign in all their graceless, sparkling revel of raillery and intrigue. No one, said Hazlitt, could read his *Plain Dealer* without being the better for it through life. He is a writer whom it is very difficult to judge fairly; but to brush him aside as a mere worn-out example of the depraved dramatic taste of a day is to show either that one has no first-hand knowledge of his work, or that one is blind to admirable stage-craft and skilful characterisation, to the sparkle of genuine wit and the play of genuine humour, though the wit is often hard and deliberate and the humour often coarse and cold.

See *The Works of Wycherley, Congreve, Vanbrugh, and Farquhar* (edited by Leigh Hunt, 1 vol.); Hazlitt's *English Comic Writers*; and Ward's *History of English Dramatic Literature* (Lond. 1875).

Wycliffe, JOHN (whose family name is also spelt *Wyclif*, *Wiclif*, *Wickliffe*, and in some thirty other ways), is believed to have sprung from a family which held the manor of Wycliffe on Tees, and to have been born at Hipswell, near Richmond, Yorkshire, about 1325. Of his early life we know nothing, except that he distinguished himself at Oxford, where he was a popular teacher. The first authentic mention of his name is in 1360, when he was master of Balliol College. He resigned the mastership soon afterwards on taking the college living of Fillingham. This he exchanged in 1368 for Ludgershall, Buckinghamshire, probably to be nearer Oxford, where his chief interests centred. Meanwhile he had for a short time held the wardenship of Canterbury Hall, having been appointed by Archbishop Islip, and deprived by Islip's successor, Simon Langham. These changes involved the question whether the hall should belong to monks or to secular priests, and Wycliffe attempted to defend his position, but after three years' litigation the papal court decided against him.

Wycliffe was already known beyond the university, and held some office, probably that of royal chaplain, at court, where he was consulted by the government, and occasionally employed as a pamphleteer. Thus on one occasion we find him defending the refusal of tribute demanded by the pope, and on another writing an apology for John of Gaunt as to infringement of the right of sanctuary in Westminster Abbey. In 1374 he was presented by the crown to the rectory of Lutterworth (q.v.), and later in the same year was sent as a commissioner to Bruges to treat with ambassadors from the pope concerning provisions and reservations of ecclesiastical benefices, abuses that caused much indignation in England. Wycliffe was no doubt chosen as a recognised opponent of papal intrusion, but less zealous colleagues were associated with him, and nothing of importance was accomplished. On his return he was appointed to a prebend at Westbury, which he at once resigned, probably because he could not consistently hold such preferment.

The next years were full of strenuous activity, which gained him support among the nobles and the London citizens. As yet the chief error charged against him was his maintenance of a right in the secular power to control the clergy and even to withdraw endowments. Such teaching was specially offensive at a time when a party among the nobility, headed by the Duke of Lancaster, was endeavouring to exclude churchmen from the great offices of state which they had been accustomed to hold. The resentment of the bishops showed itself in a summons to Wycliffe to appear before the archbishop in St Paul's, on February 19, 1377. He obeyed, but before the council could get to business it was broken up by an unseemly quarrel between the Bishop of London and the Duke of Lancaster. The pope now took the matter in hand, and in May addressed a series of bulls to the king, the bishops, and the university of Oxford, bidding them to imprison Wycliffe and make him answer before the archbishop and the pope. It was several months before any attempt was made to obey the pope's commands, and when at last some half-hearted proceedings were undertaken, they were interrupted by a mob and put an end to by an order from the young king's mother. The

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prosecution had little effect upon Wycliffe's position, for while it was going on he was consulted by the Great Council as to the right of forbidding the papal agents to take money out of the realm.

The whole fabric of the church was now (1378) shaken by the election of a second pope; the spiritual allegiance of Europe was divided, and the shock was increased by the scandalous methods to which the rivals resorted in their strife. The schism affected Wycliffe deeply. Hitherto he had attacked the manifest abuses in the church, but he now began to strike at its constitution, and declared that it would be better without pope or prelates. He denied the priestly power of absolution, and the whole system of enforced confession, of penances, and indulgence, that was bound up with it. Up to this time his controversial works had been written in Latin, and couched in the scholastic forms of which he was a master; he now appealed to the people in their own language, and began to issue the series of popular tracts which gained him the distinction of being the first writer of English prose. He organised a body of itinerant preachers, his 'poor priests,' who spread his doctrines widely through the country, and, most important of all, he began his translation of the Bible, of which as yet there was no complete English version. The work seems to have been carried through rapidly with the aid of his disciples, and was extensively circulated. See BIBLE, p. 127.

Thus far his novel views had met with much acceptance both among the gentry and the people, but he entered upon more dangerous ground when in 1380 he assailed the central dogma of transubstantiation. A convocation of doctors, called together by the chancellor of Oxford, condemned his theses and forbade him to maintain them in the university. He refused to obey, and appealed to the king, but the court was not prepared to defend formal heresy. In 1382 Archbishop Courtenay convoked a council at the Blackfriars' Convent and condemned Wycliffite opinions as represented in twenty-four theses. Wycliffe's followers were arrested, and after some time were all compelled to recant. For some unknown reason Wycliffe was not judged. He withdrew from Oxford to Lutterworth, where, in spite of a stroke of paralysis, he continued his incessant literary activity. His work in the next two years, uncompromising in tone, is astonishing in quantity, and shows no falling off in power, but on the 28th December 1384 he was again struck with paralysis, and died on the 31st. He had received a summons to appear before the pope, but had excused himself mainly on the ground of ill-health.

The characteristic of Wycliffe's teaching was its insistance on inward religion in opposition to the formalism of the time. As a rule he attacked the established practices of the church only so far as he thought they had degenerated into mere formal or mechanical uses. Thus he admits that confession may commonly be useful, and that in such cases it is a duty to resort to it, but maintains that it is a matter that rests with a man's conscience. The law which enforced confession once a year made it, he thought, a matter of form, and gave an opportunity of mischief to bad or incompetent priests. He allowed the use of images as an incentive to devotion, but denounced as idolatrous any regard for the image itself. In like manner he maintained the duty of receiving all the ordinances prescribed by the church, while saying that under special conditions they may be dispensed with, as 'God is not bound by sensible sacraments.' There has been much misapprehension of his celebrated doctrine of 'dominion as founded in grace.' According to this no one has true dominion over anything unless he is in a state of grace. This has been supposed to mean that the truly religious have a right to seize all possessions, and has been naturally scouted as subversive of society. But with Wycliffe the doctrine was purely ideal. Lordship, he says, has nothing to do with civil possession, but in the truest sense everything belongs to him for whom all things work together for good, while the wicked has no real lordship over possessions that only help him to final condemnation. The practical value of the doctrine lay in its appeal to the conscience; by an analogy with the feudal law he tried to bring home to every one his responsibility to God as his chief lord. Of the personal appearance and demeanour of Wycliffe we know little, and his portraits cannot be relied on as authentic. We are told that he was thin and worn, and that he added to wide accomplishments a charm of manner which won the regard of all with whom he had to do. His bitterest opponents had no charge to bring against his character, and his courage is shown by the frankness with which in his latest writings he maintained his opinions, although they had been publicly condemned. The influence of his teaching was wide-spread in England, and, though persecution prevented its appearance, it continued to work up to the time of the Reformation. It was manifested more strikingly in Bohemia, where Huss (q.v.) avowed himself an admirer and pupil of Wycliffe, large parts of whose works he adapted and published as his own. Thirty years after Wycliffe's death forty-five articles extracted from his writings were condemned as heretical by the Council of Constance, which ordered the bones of the heretic to be dug up and burned, a sentence executed thirteen years later.

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Wycombe, a market-town of Buckinghamshire, stands, surrounded by beech-clad hills, on the Wye, a small feeder of the Thames, 25 miles ESE. of Oxford and 29 (by rail 34½) WNW. of London. Called variously Chipping (or Chepping) Wycombe and High Wycombe, it was the seat of a Saxon fortress, Desborough Castle, some remains of which may be seen, and has a fine cruciform parish church (1273–1522; restored 1874–88) with a tower 96 feet high, a guildhall (1757–1859), a literary institute (1854), a free library, a hospital (1875, endowed and enlarged with the balance of the Beaconsfield Memorial Fund), a grammar-school (1555; new buildings, 1883), and an auction-mart (1887). Lace is made, but the staple manufacture is that of beech-wood and other chairs—between one and two millions annually—with latterly whole furniture suites of a very high character. There are also some large paper-mills in the town and district. Hughenden and Chalfont, both noticed separately, are near. Wycombe, which returned two members till 1867, and then one till 1885, was governed by a mayor in Henry III.'s time, but first incorporated by Henry VI.; the municipal boundary was extended in 1880. Pop. (1881) 10,618; (1891) 13,435.

See works by Thomas Langley (1797), H. Kingston (1848), and John Parker (1878).

Wye, a river of Wales and England, of great picturesque beauty, an affluent of the Severn, has its origin in two copious springs which issue from the south-east side of Plinlimmon, not 2 miles from the head-water of the Severn (q.v.). It thence flows 150

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miles in a generally south-east direction through or along the borders of the counties of Montgomery, Radnor, Brecknock, Hereford, Monmouth, and Gloucester, till it enters the Severn's estuary below Chepstow. At Chepstow the tide has been known to rise 47 feet above low-water mark. The chief affluents are the Lug and Ithon on the left, and the Monnow, the Caerwen, and Irfron on the right. Fly-fishing for salmon has suffered much from netting at the mouth; and the Wye is not much of a boating river, though a pair-oar has been rowed down it from Boughrood, above Hereford. The part of the river separating Monmouth from Gloucester is that chiefly visited for its singular beauty.

See CHEPSTOW, TINTERN, ROSS, &c., and works by W. Gilpin (1782), C. Heath (1800), L. Ritchie (1841), W. and M. Howitt (1863), and G. P. Bevan (1887).

Wykeham, WILLIAM DE, was one of those ecclesiastics who from small beginnings rose to almost princely power. Froissart says that in his day 'everything was done by him and nothing without him.' So obscure was his origin that there has been a controversy as to what was his surname. His mother, Sibilla, was the granddaughter of the 'Lord of Stratton,' but his father was a yeoman called John Longe, perhaps on account of his stature. He was known as 'William,' born at Wickham—a small Hampshire village, 3 miles from Fareham. The place was sometimes called Wickham-Scures from the family to whom it belonged; and Sir John Scures, who was almost the viceroy of the southern counties, took a liking to William and sent him to the Prior's school at Winchester. There he learned French, some Latin, arithmetic, and geometry. On his leaving school Sir John appointed him his secretary, and introduced him to Bishop Edington, who presented him to Edward III. In 1351 Sir J. de Brocas was in a commission for repairing Windsor Castle, and Wykeham's first important work was that of assisting in the construction of the Round Tower. He was appointed surveyor of Windsor and other royal castles in 1359, built Queensborough Castle in 1361, was Keeper of the Privy-seal and secretary to the king in 1364, and in 1367 was consecrated Bishop of Winchester and Chancellor of England. Towards the end of Edward III.'s reign he, and many others, had some differences with the Duke of Lancaster and Alice Perrers, but he found means to conciliate her and proceed with the founding of his colleges. In 1380 New College, Oxford, was commenced, and in 1387 Winchester School was begun, which was finished in 1393. Next year, when seventy years of age, he undertook the transformation of the nave of Winchester Cathedral, personally supervised the work until the last two years of his life, and probably drew his own plans. The money he laid out on building would altogether represent half a million at the present time. In 1404 he finished his magnificent chantry at Winchester, and, dying in that year, was buried in it, on the spot where as a boy he used to kneel before the figure of the Virgin. He regarded Mary as his especial patroness, and dedicated both his colleges to her. Wykeham held large church preferment, but had he lived later would probably have been merely a great architect. He was not an ardent theologian, and Wycliffe spoke lightly of him as 'a builder of castles.' But he was generous and religious—he founded his colleges 'first for the glory of God and the promotion of divine service, and secondarily for scholarship.' His famous motto was 'Manners' —i.e. morals—'maketh man,' and he carried out useful reforms at St Cross and in St Swithun's. In politics he was national as opposed to papal. At the close of his life he was present in the parliament when Richard II. was deposed, and in the first one held by Henry IV. He has been called the 'Father of the public-school system;' and although he did not invent the Perpendicular architecture, he established it, and saved the Gothic in England from the degeneracy it underwent abroad. His style of building can best be studied at Winchester. These relics of Wykeham remain at New College: an autograph letter, parts of his mitre, his silver Pastoral Staff (q.v.), silk gloves, and jewelled morse. In the British Museum are some charters in his handwriting.

See WINCHESTER and works there cited; and Lives by Lowth (1759; new ed. 1777), Chandler (1842), Moberly (1887), and Basil Champneys (*Art Journal*, 1888).

Wynaad, or WAINÁD (better Vayanád), a highland district, mainly a tableland, in the Western Ghâts, about 3000 feet above sea-level, and belonging partly to the Nilgiri district, partly to Malabar. The name is well known in England through the auriferous quartz almost universally distributed throughout the region, which began to be worked as a gold-field about 1865, and, after absorbing in 1876–86 millions of British capital, failed to fulfil the extravagant expectations formed.

Wynberg, a town on the SE. slopes of Table Mountain, 8 miles SE. of Capetown by rail, the centre of a rich wine-growing country; pop. 4000.

Wynkyn de Worde. See WORDE.

Wyntoun, ANDREW OF, an old rhyming Scottish chronicler, about whom we know only that he was a canon regular of St Andrews, who about 1395 became prior of the monastery of St Serf on Lochleven, and that he wrote *The Orygynale Cronykil of Scotland*. Though with the usual proportion of extravagant fable, his work is not without considerable historical importance; while philologically it has very distinct value, as a specimen of the old Scotch, then as nearly as might be identical with the contemporary dialect of England. The *Cronykil* is brought down to 1406, and consists of nine books or cantos, of which only the last four are devoted to Scottish history; the first five giving a fragmentary outline of the history and geography of the ancient world. From his quotations Wyntoun seems to have been a well-read scholar for his time. His style is not essentially different from Barbour's, and his versification is the same—the pleasant octosyllabic. David Macpherson edited the Scottish portion (2 vols. 1795); and a complete edition was published by David Laing in the 'Historians of Scotland' series (3 vols. 1872–79).

Wyo'ming, a north-western state of the American Union, ranking eighth in area and third lowest in population of all the states and territories, lies mainly on the eastern slope of the Rocky Mountains. It is bounded on the N. by Montana, E. by South Dakota and Nebraska, S. by Colorado and Utah, and W. by Utah, Idaho, and Montana. From east to west the length is 360 miles, and the width from north to south is 275 miles. Area, 97,890 sq. m. The state is traversed by the main axis of the Rocky Mountains, which constitutes the continental divide, and the greater part of it is a mountainous region. The northern group of the Rocky Mountain system finds here its greatest development, and is noted for its wild and rugged character and for its picturesque scenery. In the west central part are the Wind River Mountains (see UNITED STATES), in the north central part the Big Horn Mountains, in the extreme north-east the Black Hills extending into South Dakota, in the south-east the Laramie Range, in the south the Medicine Bow Mountains, north of which are the Sweetwater and Rattlesnake ranges, and in the west the Teton, Shoshone, and Gros Ventre ranges. Among the principal peaks are Frémont's Peak (13,790 feet), Mount Hayden (13,691 feet),

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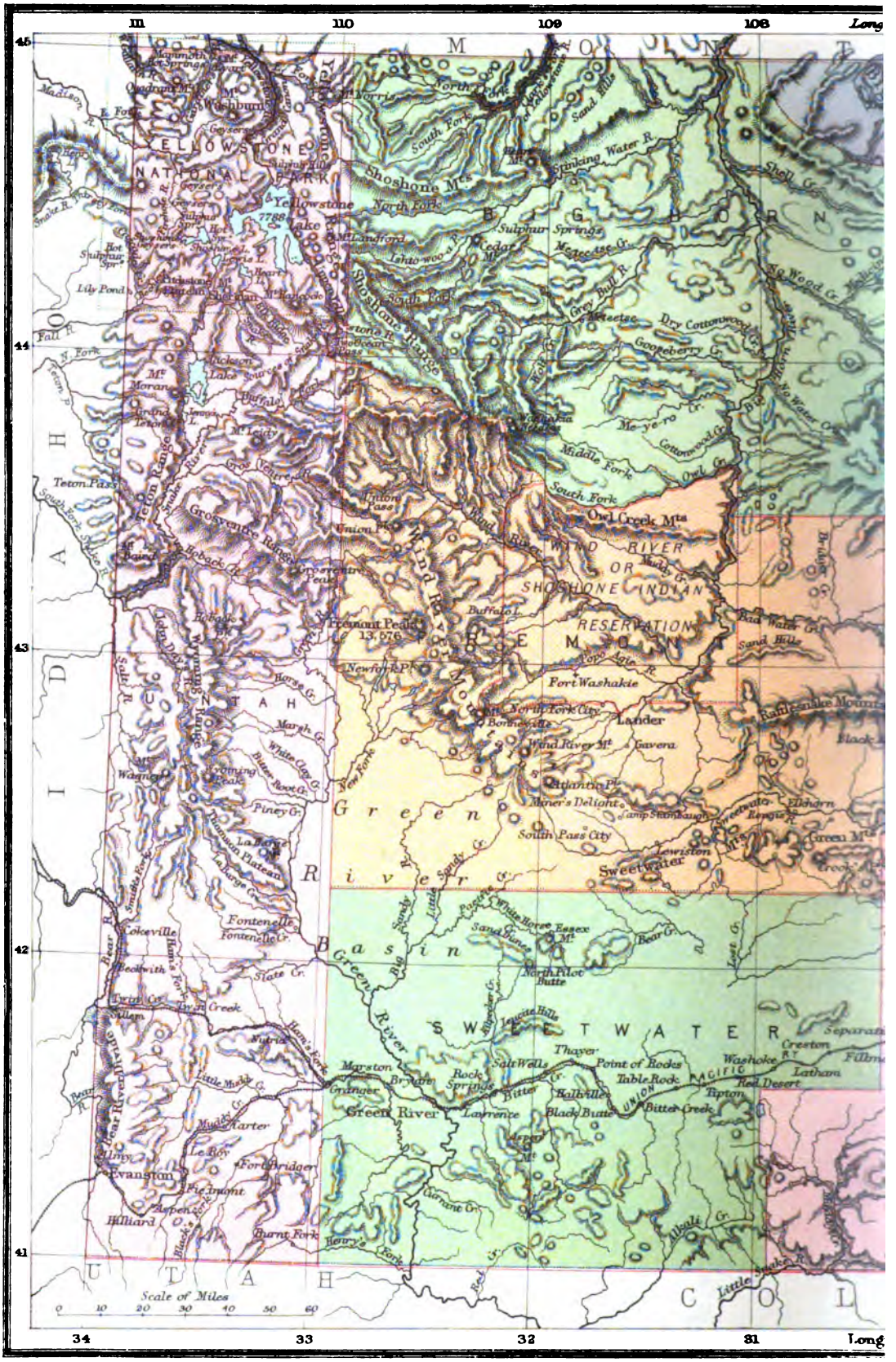

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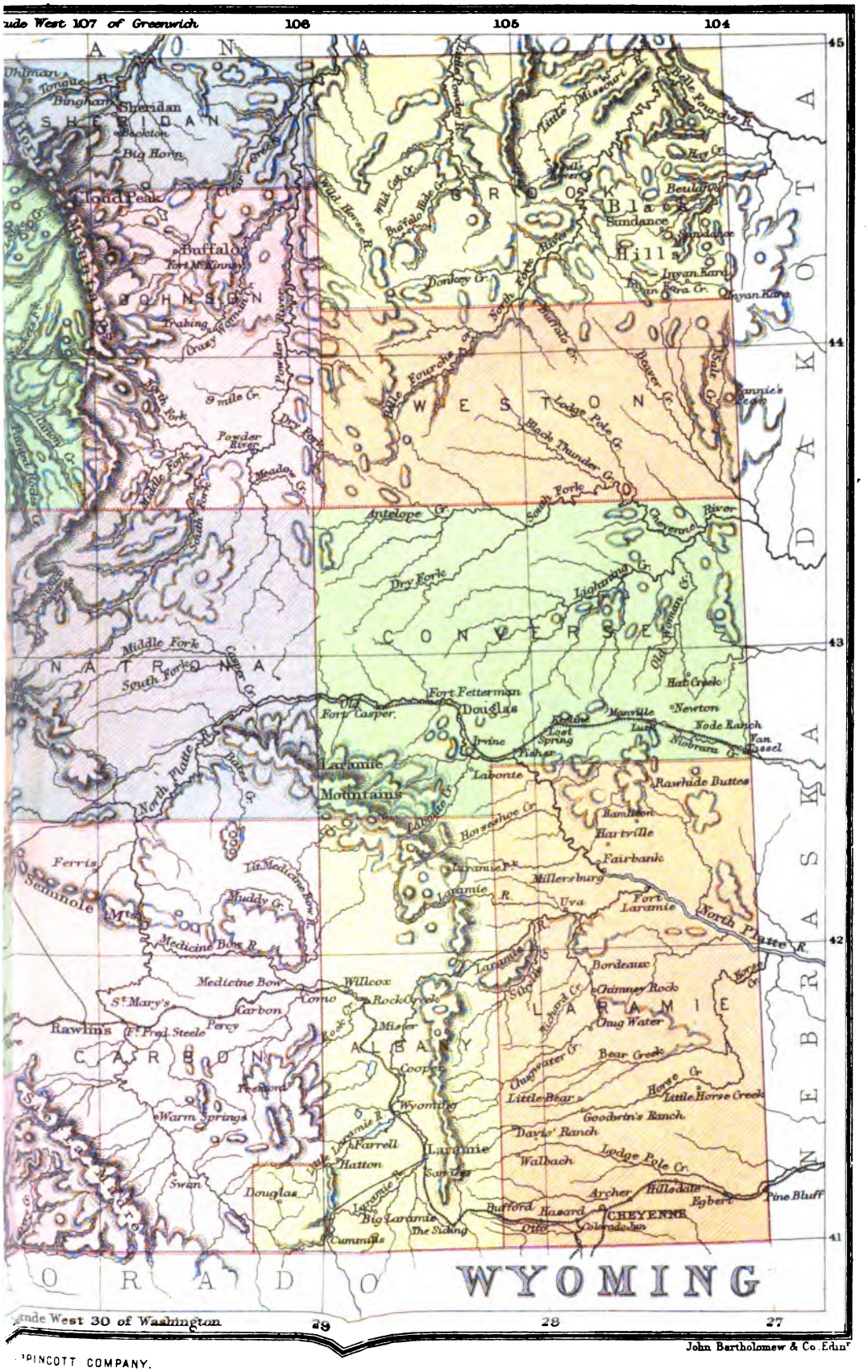

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Snow's Peak (13,570 feet), Wind River Peak (13,499 feet), Mount Chauvenet (13,000 feet), Mount Hooker (12,900 feet), Mount Moran (12,800 feet), and Washakie Needle (12,253 feet). The Yellowstone (q.v.) National Park, 3600 sq. m. in area, occupies the north-western corner, and is mainly within the limits of this state. The mountains are covered with forests of considerable extent, occupying one-eighth of the total area. Interspersed between the ranges are broad plateaus with arable soils, which with proper irrigation yield prolific crops; but less than one-sixth of the state altogether is estimated to be capable of cultivation. Wyoming is essentially a grazing country, and at present supports over 1,500,000 cattle, and 1,000,000 sheep. The mean elevation of the plateau regions is from 7000 to 8000 feet. Yellowstone Lake has an altitude of 7778, Lewis Lake 7750, and Shoshone Lake 7670 feet above the level of the sea. The south-western portion of the state slopes towards the Pacific Ocean and forms a part of the Green River valley. The eastern part of the state is drained by tributaries of the Missouri, the western by the Snake or Shoshone River, which ultimately joins the Columbia, and in the south-west is the Green River, which eventually discharges its waters into the Colorado. In the mountain regions are deposits of gold and silver and ores of copper and iron. Near Evanston, Carbon, and Rock Springs, and in some other localities, there is found a superior quality of soft coal in great abundance. These deposits are extensively worked, and furnish fuel for nearly all the railroads and for the towns and settlements of the state. The state also possesses valuable deposits of soda, some tin, abundance of limestone, and oil-wells. There are hundreds of thousands of acres of fine pasture-land in Wyoming where cattle may feed throughout the year. Nearly three-quarters of the area of the state is yet open for settlement under the Homestead (q.v.) laws. The climate is dry, although the country is well watered by streams. The summers are mild and delightful. In exposed regions the winters are severe, but in general the climate is conducive to health and comfort. Besides grazing, mining and agriculture are the leading industries. The state is divided into thirteen counties, and has one representative in congress. The chief towns are Cheyenne, the capital, Laramie, Rock Springs, Rawlins, and Evanston. Wyoming comprises portions of the territory acquired by the Louisiana Purchase of 1803, and of that obtained by the treaty with Mexico in 1848. It was organised as a territory in 1868, and admitted as a state in 1890. Pop. (1870) 9118; (1880) 20,789; (1890) 60,705.

Wyoming Valley, a beautiful, fertile valley on the Susquehanna River, in north-eastern Pennsylvania, about 30 miles long by 5 wide, its name supposed to be a corruption of the Indian *Maughwauwama*—'large plains.' It was purchased (1754) by a Connecticut company from the Six Nations, but the settlers were soon dispersed by hostile savages. In 1769 forty pioneers came from Connecticut, but found a party of Pennsylvanians in possession, and for several years there were continual contests between the rival settlers, the Connecticut colony finally proving successful, and their town of Westmoreland growing to 2000 inhabitants. On June 30, 1778, when most of their men were serving or had fallen under Washington, a force of 400 British provincials, or 'Tories,' and 700 Seneca Indians, led by Colonel John Butler, entered the valley, and were opposed by 300 men, under Colonel Zebulon Butler. On July 3 the settlers were driven to the shelter of Fort Forty (named after the pioneers), with the loss of two-thirds of their number, many soldiers and inhabitants being murdered; a half-breed Indian woman, called Queen Esther, having, in revenge for her son's death, tomahawked fourteen prisoners with her own hand. On the 5th the remnant of the troops surrendered, and they and the inhabitants were either massacred or driven from the valley, which was left a smoking solitude. Campbell's *Gertrude of Wyoming*, founded upon this disaster, contains exaggerations and misstatements, notably that of attributing the leadership to Brant (q.v.), who was not in the expedition. The disputes between the Connecticut and Pennsylvanian settlers were not finally settled for several years after. The valley is now one of the most flourishing districts in the state, and very rich in anthracite coal.

Wyre Forest, in the north-west of Worcestershire, near Bewdley, forms the southern part of the Severn coalfield.

Wyss, JOHANN RUDOLF, author of *The Swiss Family Robinson*, was born at Bern, 13th March 1781, became professor of Philosophy there in 1806, later chief-librarian also, and died 31st March 1830. His *Vorlesungen uber das höchste Gut* (2 vols. 1811), *Idyllen und Erzählungen aus der Schweiz* (3 vols. 1815–22), and the great collection of his editing, *Alpenrose* (20 vols. 1811–30), would hardly have preserved his name but for the idyllic simplicity, the vigour, and interest of *Der Schweizerische Robinson* (2 vols. 1812–13), which has been frequently translated—the 1st series into English in 1820, the 2d in 1849.

Wyttenbach, DANIEL, a great Dutch scholar, born at Bern, 7th August 1746, studied at Marburg, Göttingen, and Leyden, became professor of Greek at the Remonstrant gymnasium at Amsterdam in 1771, of Philosophy at the Athenæum in 1779, and succeeded in 1799 to Ruhnken's chair of Rhetoric at the university. He retired in 1816, and died after some years of blindness at Osgeest, 17th January 1820. His greatest work is the edition of Plutarch's *Moralia*, with rich annotations and an admirable *Index Græcitatis in Plutarchi opera* (Oxf. 8 vols. 1795–1830).

Other works are his *Præcepta philosophiæ logicæ* (1782), *Ecloyæ seu selecta principum historicorum capita* (1793), *Vita Ruhnkenii* (1800), and an admirable edition of Plato's *Phædo* (1810). See Mahne's *Vita* (1823).

His wife, Johanna Gallien, a niece of Hanau, whom he married at seventy-two, was a remarkably accomplished woman. She lived after her husband's death at Paris, was given the degree of doctor in philosophy by Marburg in 1827, and died at Leyden in 1830. Among her writings were *Théagène* (Paris, 1815), *Das Gastmahl des Leontis* (Ulm, 1821), and the romance, *Alexis* (Paris, 1823).

Wyvern (from Lat. *vipera*), a fictitious monster allied to the dragon and the griffin, and frequently occurring in heraldry. It resembles a dragon, but has only two legs and feet, which are like those of the eagle.

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the last letter in the pre-Ciceronian Roman alphabet, and the twenty-fourth in our own, is descended through the Greek *Xi* from *Samekh*, the fifteenth Semitic letter, whose Egyptian parentage is explained in the article ALPHABET (Vol. I. p. 187). The oldest form of *xi* was ⊹, which is almost identical in form with the Phœnician letter. In the eastern Greek alphabet the vertical stroke disappeared and the form became =, which has the value of *x* in Greek. In the Chalcidian and Western alphabets the upper and lower crossbars disappeared, leaving the sign +, which afterwards became ×, to represent the sound of *x*. In the eastern Greek alphabet the unrelated sign ×, derived from another source, represented the sound *ch*. In the original Italic alphabet the letter must have existed, as is proved by its occupying, like *xi*, the fifteenth place, after *n*, in three ancient abecedaria recently discovered in Italy; but its position at the end of the Latin alphabet, *ultima nostrarum*, as Quintilian calls it, proves that it must have been disused and then afterwards re-adopted. It is found in an inscription written in 186 B.C., and in an undated inscription which may be some thirty years earlier. In modern English *x* has the value of *ks*, which it had in Anglo-Saxon; except at the beginning of a word, where it is pronounced like *z*. In Italian *x* has been replaced by *ss*, as in *massimo* for *maximus*. In French *ss* sometimes replaces *x*, as in *cuisse* and *laisser*, from *coxa* and *laxare*, while *us* may become *ux*, as in *yeux*, *eux*, *deux*, and *époux*. In Spanish *x* had the power of the German *ch*, but the Spanish Academy has decreed its replacement by *j*; Mexico, Xalapa, and Don Quixote being now spelt *Mejico*, *Jalapa*, and *Don Quijote*. As a numeral, X stands for ten (see NUMERALS); X as an abbreviation represents the word Christ (see CROSS)—hence Xian, Xmas; *x* in Algebra is the first of the unknown quantities; and the use of X, XX, and XXX on barrels of stout is a well-known way of indicating the quality.

Xanthin (Gr. *xanthos*, 'yellow'), a name given to the yellow colouring matter of various flowers, to a principle in madder, and to a deposit of urine.

Xanthippe. See SOCRATES.

Xanthoxylum, a genus of the Rutaceæ, comprising over one hundred species, of which many are found in Brazil and the West Indies. Of five found in the United States the best known is the Prickly Ash or Toothache Tree (*X. fraxineum*), the bark and its extracts being used for toothache and rheumatism, and also as a tonic. Some species are called Fustic, Pepper, Yellow-wood, &c.

Xanthus, the capital of ancient Lycia (q.v.), on the river Xanthus, 8 miles from its mouth. It offered a desperate but vain resistance to Cyrus' army under Harpagus, in 546 B.C., and again in 42 B.C. to Brutus. In ancient times it was rich in temples and sepulchral monuments, and extensive remains were discovered by Sir C. Fellows (q.v.).

Xavier, FRANCISCO, the 'Apostle of the Indies,' was born of a noble family at his mother's castle of Xavero or Xavier, near Sanguesa, in the Basque country, April 7, 1506, youngest son of Juan de Jasso, privy-councillor to Jean d'Albret, king of Navarre, and his wife Maria Azpilcueta Xavier. He was sent in his eighteenth year to the college of St Barbara at Paris, and was already a lecturer on the Aristotelian philosophy when he made the acquaintance of Ignatius Loyola (q.v.), with whom ere long he became associated in the foundation of the Jesuit Society (1534). Ordained priest at Venice in 1537, he lived some years at Rome in the service of the society. John III. of Portugal having resolved to send out members of the new order as missionaries to the Portuguese colonies in the east, Xavier was chosen in the place of Bobadilla, who was prevented from going by sickness. He sailed from Lisbon, April 7, 1541, wintered at Mozambique, and arrived at Goa, May 6, 1542. His first task was to rouse a spirit of penitence and religious fervour among the corrupt Europeans, and thus remove the great obstacle to the conversion of the native population. His efforts were eminently successful, and he was equally blessed in his labours among the pearl-fishing population of the coast. After a stay of more than a year in this region he returned to Goa, and with fresh assistants visited the kingdom of Travancore, where in a single month he baptised 10,000 natives. Passing thence to Malacca, he next proceeded in 1546 to the Banda Islands, to Amboyna, and the Moluccas, and then retraced his steps by Malacca (1547) and Manassar to the island of Ceylon, where he converted the king of Kandy with many of his people. His next ambition was the conversion of the Japanese empire, which had been suggested to him at Malacca by Han Siro, a Japanese exile. His preaching at Miako and Fucheo was attended with extraordinary fruits, and the splendour he had put on here from motives of policy so much impressed the Japanese that the mission he founded was allowed to flourish for above a hundred years. Xavier's mission to Japan occupied about two and a half years; he returned to Goa in 1552 to organise a mission to China. But the intrigues of the Portuguese merchants and the envious hatred of the governor of Malacca to Pereira, the envoy to China he had chosen, raised so many difficulties that his spirit gave way, and he sank under the combined weight of mental depression and physical sickness, on the very threshold of what he had looked to as the great enterprise of his life, in the island of Sancian, December 22, 1552. His body was conveyed to Malacca, and thence with great solemnity to Goa, March 15, 1554. Many miracles, attested by numerous witnesses, were reported of Xavier in almost all the stages of his career. Among these is reckoned the miraculous gift of tongues, and this was fortunate, for it appears that by nature he had no gift for languages. The evidence of these miracles was submitted to the usual process of inquiry at Rome, and, many miracles having been established, Xavier was beatified by Paul V. in

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1619, and canonised by Gregory XV. in 1622, his festival being fixed upon 3d December.

His only literary remains are a collection of Letters, in 5 books (Paris, 1631), and a Catechism, with some short ascetic treatises. His Life, by Père Bouhours (1684), was translated by James Dryden, brother of the poet. There are also Lives in Latin by Torsellino (1596), in Italian, by Bartoli and Maffei (1653), in German, by De Vos (1877), and in English, by Venn (1862) and H. J. Coleridge (1873). See also Sir J. Stephen's *Essays in Ecclesiastical Biography* (1849).

Xebec. See SAIL.

Xenia, capital of Greene county, Ohio, on the Little Miami River, 65 miles by rail NNE. of Cincinnati, the centre of a rich agricultural district. It has a Methodist college, a normal school, a U.P. seminary, hospital, and the state Soldiers' and Sailors' Orphan Home. Pop. (1890) 7301.

Xenocrates, an ancient philosopher, was born at Chalcedon 396 B.C., and governed the Academy as successor to Speusippus, himself the successor of Plato, from 339 till his death in 314. He wrote numerous treatises upon dialectics, physics, and ethics, of which the titles only have been preserved; and what is known of his doctrines is gathered only from notices in various authors. He introduced into the Academy the mystic Pythagorean doctrine of numbers in connection with the *ideas* of Plato.

Xenophanes (fl. 540–500 B.C.), founder of the Eleatic School (q.v.).

Xenophon, Greek historian, miscellaneous essayist, and military commander (*c.* 435–354 B.C.), was son of Gryllus, an Athenian knight. The biography by Diogenes Laertius, and the scattered notices of him found in other ancient writings, together with the data supplied by his own *Anabasis*, are the only materials for his life. Little or nothing is known of the first thirty-five years which he spent at Athens, except that he came under the influence of Socrates from an early period. The tradition of his having been rescued by that philosopher at the battle of Delium, 424 B.C., which would carry back the date of his birth to 444–443, is probably apocryphal; at any rate it is inconsistent with his own statement about himself in the *Anabasis* (III. i. 25). In 401, the political situation of Athens offering no scope for his activity, he accepted the invitation of Proxenus of Bœotia—an old guest-friend and adventurer in command of a regiment of Hellenic mercenaries under Cyrus—to join him at Sardis and take service under the Persian prince in his military enterprise, directed ostensibly against the Pisidians, a refractory vassal tribe, but really against his own brother, King Artaxerxes Mnemon; but he went in a civil rather than a military capacity. It was only after the failure of this bold scheme of usurpation, and the death of the rebel prince in the affray between the two brothers in the plain of Cunaxa (Babylon), September 3, 401, that Xenophon became one of the regular officers, and finally the successor of Proxenus in the supreme command of the Ten Thousand Greeks left alone in the centre of the Persian empire, when five of their generals and twenty subordinate officers had been treacherously massacred in the enemy's camp, and there was a general break-up of the Cyreian Asiatic insurgents. Xenophon thereupon became the life and soul of the army in its march of 1500 miles, as they fought their way against the ferocious mountain tribes through the rugged highlands of Armenia and the ice and snow of an inclement winter, and conducted them with such skill, foresight, and prowess that in five months they were able to reach Trapezus (*Trebizond*), a Greek colony on the Black Sea, and ultimately Chrysopolis (*Scutari*), opposite Byzantium, on the Bosporus, in October 399. After further adventures and difficulties, they accepted service for a short time under Seuthes, a Thracian chief, who wanted their aid in recovering the kingly power, and finally recrossed to Pergamus, where Xenophon provided them with permanent service in the Lacedæmonian army under Thibron, who had been engaged to continue the war against the satraps Pharnabazus and Tissaphernes, for the deliverance of the Æolian Greeks from the Persian yoke. It is not certain what became of Xenophon after Thibron's recall—whether he went back to Athens, as it appears from vii. 7, 57, he intended; but the evidence seems to show that he continued with his successor Dercyllidas, and that the sentence of banishment for 'laconism'—in other words, attachment to the cause of a traitor in alliance with Sparta—was passed against him in 399, the year of the execution of his old friend and master, Socrates. If he did go back to Athens, he must have returned to Asia in 396, when a new epoch in his life began with the arrival of Agesilaus in command of a new Spartan army. With this great king Xenophon, who saw in him the ideal of a Greek hero, formed the closest friendship. He accompanied him in his eastern campaign, and was in his suite when he returned to Greece to conduct the war against the newly-formed anti-Spartan league of Athens, Corinth, and Thebes (394), and witnessed the battle of Coronea, of which he gives a graphic description (*Hell.* IV. iii. 16 ff.). Such disloyal and unpatriotic conduct may be explained, if not excused, by his political sentiments. Xenophon saw no hope for Athens, except in league with Sparta. If Athens and Sparta combined, then might Greece be mistress of the world. Hence his aversion for the democratic party at Athens, which was the chief hindrance to such an union. Xenophon accompanied the king to Sparta, where he resided on and off, until, in compensation for the loss of his country and in recognition of his services, the Spartans presented him with an estate at Scillus, one of the Triphylian towns taken from Elis (400), lying on the road from Lacedæmon to Olympia. Here in 387 he went with his wife Philesia and his two sons, Gryllus and Diodorus; here he spent some twenty years of his life, careless of war and politics, indulging his taste for literary work and the pursuits of a country gentleman. Here, too, were penned most of his important books. But the break-up of Spartan ascendency after the battle of Leuctra (371) drove him from his tranquil retreat to seek a home elsewhere. The Athenians, who had now joined the Spartans against Thebes, repealed the sentence of banishment against him, but he did not avail himself of this act of grace to return to his native place; he travelled towards it, but no farther than Corinth, where he took up his abode and lived to *c.* 355.

The writings which Xenophon has left behind him are not a bad index of his character; they give us the idea of having been written with great singleness of purpose, modesty, and love of truth. The leading feature of his character seems to have been an active susceptibility and admiration for all that is noble and beautiful. This trait will account for his faithful attachment to great personalities like Socrates, Agesilaus, and the younger Cyrus, and explain why in his narrative of particular actions or description of individuals he makes a point of presenting the bright side of things and concealing the dark, while in his philosophical works he brings on the scene almost exclusively noble and pleasant portraits. With this lovable trait he unites on the one hand a natural kindness and mildness of disposition, and on the other good sense, firmness, and courage. While his intercourse with Socrates and his studious habits

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stimulated and elevated his higher nature, his lower nature was invigorated by gymnastic and warlike exercises, so that he realised in a high degree the Greek ideal of perfect manhood in the symmetrical development of his bodily and mental powers. Nor did age obliterate his youthful impressions. He retained the strong religious sentiments and profound conviction of a divine mediation in the government of the world throughout life, and turned to account in his own practical way the splendid teaching of Socrates, although he had no capacity for pure philosophical speculations. They have a direct or indirect relation to some particular period of his life, in their outward circumstances, their political and civil bearings, and their spiritual tendency. They may be conveniently distributed into four groups: (1) Historical—the *Hellenics*, *Anabasis*, and *Encomium of Agesilaus*. (2) Technical and didactic—on *Horsemanship*, the *Hipparchicus* or 'Guide for a cavalry commander,' and the *Cynegeticus* or 'Guide to Hunting.' (3) Politico-philosophical—*The Lacedaemonian Polity*, *The Cyropaedeia*, *Athenian Finance*. (4) Ethico-philosophical—*Memorials of Socrates*, *Symposion*, *Oeconomicus*, *Hieron*, *Apology of Socrates*. The *Polity of Athens* is now commonly regarded as an anonymous work written about 415 B.C., which was incorporated in the collection of Xenophon's works only because of its analogy to the *Polity of Lacedaemon*. The style and language of Xenophon is unaffected, simple, and clear, without any attempt at ornamentation; it is well described by Dionysius, the greatest of ancient Greek critics, in his *Letter to Pompeius*, as 'sufficiently pure and clear; in the choice of expressions he prefers those which were ordinary and suitable to the actions, and he arranges them in a pleasant and agreeable manner'—and this judgment is confirmed by Quintilian, the greatest of Latin critics. The dialect he uses is the Attic, but not the purest; his long absence from Athens and intercourse with Ionians and Lacedæmonians familiarised him with many foreign words which he does not hesitate to employ if they serve his purpose.

The *Hellenica* comprise the history of Greece during a period of forty-nine years, in three parts, of which Book i. and part of Book ii., in continuation of the work of Thucydides, centred on the affairs of Athens from 411 B.C. to the reconciliation of parties after the expulsion of the Thirty (403). It presents distinguishing features, which go to prove that it was compiled at an earlier period than the ensuing five books, contemporaneously with the events, and under different impressions, before the author's undue Laconism prevailed over his Attic patriotism. The second part, comprising Books iii.–v., is almost exclusively taken up with the history of Sparta from her war with the satraps of Asia Minor (399) to the peace of Antalcidas (387). The third part comprises the general history of Greece to the battle of Mantinea (362). The historian is silent on domestic topics between 403 and 399—the years in which the events recorded in the *Anabasis* took place. We learn from an allusion in the text (VI. iv. 37) to the death of Alexander of Pheræ that the work was not embodied in its present form before 357. The unaffected ease and simplicity of Xenophon's language, his vivid sketches of tragic and striking scenes, and the lively and appropriate speeches which he has introduced in his narrative will always secure him admirers, but they do not entitle him to a place among great historians. He has no such reflections on the causes and consequences of events as are found in Thucydides, nor any of those profound views which tell of the power of generalisation in the author. There is, moreover, a disproportion between the importance of events and the space they occupy in his narrative. Thus the peace of Antalcidas—an event which changed the essential relations of the Hellenic confederacy—is recorded with excessive brevity. Decisive battles, as those of Leuctra, Arginusæ, and Ægospotami, are dismissed with a brief notice, while the greatest men of the age, Epaminondas, Pelopidas, and Conon, are thrown in the background. To a certain extent this may be accounted for by the circumstances of the age in which Xenophon lived, when the individual was entirely merged in the state, and it was not yet the fashion, as it became in a later period, to connect great events and achievements with the names of the actors in them. When, therefore, Xenophon speaks of the Thebans generally, it does not follow, as a matter of course, that he wishes to belittle Epaminondas. His credit as a historian has been impugned for allowing his judgment to be warped by his political likes and dislikes; but the charge of garbling or suppressing, distorting, or colouring details according to his sympathies and of a general want of veracity cannot be sustained, as has been recently shown by A. Holm in his *Griechische Geschichte* (1891).

The *Anabasis*, from a strictly historical point of view, is inferior in real value to the *Hellenica*, the event from which it takes its title, 'a going up country,' being merely an incident in the history of Persia, and of no political importance. But it is, upon the whole, the best composed, as it is the most popular, of Xenophon's writings. It is essentially an autobiography of the most eventful part of his life, and combines much of the charm of a historical romance and many elements of ethic interest with its character of authentic history. The first of the two integral parts into which the work resolves itself contains the expedition and death of Cyrus, which occupy but six months of time and less than a sixth part of the text; the second, the *Katabasis* or adventures of the Greek mercenaries on their return after the battle of Cunaxa, which extend over eighteen months and form the principal source of attraction. In the former part Cyrus is the principal actor, in the latter Xenophon himself. The whole may be regarded as filling up the gap between the second and third books of the *Hellenica*, the latter of which begins with a statement which has supplied matter for much speculation among commentators—that 'the story how Cyrus collected an army, with which he marched up the country against his brother, and how the battle was fought and how he was killed, and how after this the Greeks effected their retreat to the sea, has been related by Themistogenes of Syracuse.' It is impossible to say what motive Xenophon had for passing off his own work as the production of another. It can hardly be that, not having yet composed his own *Anabasis* at the time when he published this portion of his *Hellenica*, he could only quote an entirely different work, for it is not likely that there was already published and in circulation a second narrative besides that of Sophænetus, known to us by quotations in the geographical lexicon of Stephanus of Byzantium (472 A.D.). Plutarch, the only extant ancient writer who refers to this mention of Themistogenes, says that Xenophon's object was to secure greater credit to the record of his own exploits than might have attached to it were it known to have been composed by himself. It is remarkable that neither Diodorus Siculus, whose account of the *Anabasis* is the longest next after Xenophon's, nor Plutarch, in his occasional quotations of Xenophon—both of them honest though uncritical writers—awards him even a moderate amount of the credit which he claims for himself as its foremost hero. The *Anabasis* was not published until after the battle of Leuctra (371), as appears from the references in the fifth book to the author's past life at Scillus.

The *Agesilaus* is a separate memoir in praise of the Spartan king, the author's idol, reproducing the notices of him from the *Hellenica*, with added observations on his expedition to Egypt and death (360). The three technical treatises on *The Art of Horsemanship*, *Cavalry Service*, and *The Chase* are on subjects with which the author had a thorough practical acquaintance. The first is written in a graceful and lively strain, and, so far as it goes, with great accuracy and completeness. The *Hipparchicus* is a less valuable manual of the duties of a cavalry general. The third tract enters with the zest of an enthusiastic sportsman into minute details of harriers and hounds, their breed, points, and method of training, their collars, couples, slips, of the snarer and his apparatus, of the natural history of the hare.

In the *Lacedaemonian Polity* Xenophon has illustrated what he regarded as the best form of a mixed government. M. H. Bazin, in his study on the work (Paris, 1885), thinks that it is an *écrit de circonstance*, written 394 B.C., with a political object, at a time when Sparta

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was divided between two parties, the innovators, at whose head had been Lysander and whose views were set forth in a pamphlet by Cleon of Halicarnassus, and the conservative party, led by Agesilaus, who were bent on restoring the real or fancied political virtue of bygone days. This latter tendency Xenophon set himself to help by writing a reply to Cleon. It dwells on those points which the known or supposed plans of Lysander threatened most, as the powers of the kings. It recommends the old-fashioned Spartan virtues by discreetly supposing that every one already practises them. It appeals indirectly to the military spirit of the Spartiate by ignoring the Perioeci and the Helot soldiers, and by mentioning mercenaries with contempt—an attitude which on any other theory is incomprehensible.

The *Cyropaedeia*, or 'The education of Cyrus,' which is not properly a history, but a didactic romance with a historical groundwork, is of great interest, as being the first work of the kind in Greek literature. It was highly prized by ancient critics, and, in the opinion of some modern scholars, ranks highest among Xenophon's works in point of literary merit. Xenophon adopted this form of composition as a vehicle for setting forth his own theory of government and his views of law and society in accordance with the writers of the Socratic school—to exhibit the model of a good and wise governor, and to show how citizens can be formed by such an one to be virtuous and brave. He chose for his exemplar the Persians and Cyrus the Great, the founder of their empire, whose life he divides into three sections, two of which, concerning his education as a boy and his training as a youth at the court of his maternal uncle, Astyages, king of Media, together fill but one book, which has given its name to the whole eight, the influence of the national system of education on his hero's character being the mainspring of his own subsequent greatness as founder and organiser of the empire, and of the ascendency which the Persians under his auspices acquired over other Asiatic races. In its details the biography is pervaded by the Socratic spirit. Though the East supplies the background and colouring of the picture, only a few vestiges of Oriental usages and methods of thought are to be met with, for the writer had very little knowledge of them, and made that little go a long way. His materials were borrowed from Sparta. There is no dramatic plot in the work, but a string of successive situations, each calling forth and displaying the hero's aptitude for the art of command, without which hearty obedience is impossible. The episode of Abradatas and Panthea—our earliest sentimental romance—shows much simple pathos, and the striking address of Cyrus to his sons on the immortality of the soul was made large use of by Cicero. The epilogue, on the decadence of the Persians, being the eighth chapter of the last book, could not have been written before 362 B.C., because mention is made in it of two events which, as we know from other sources, took place in that year.

In the tract entitled *Poroi*, or 'Means,' *c.* 356, Xenophon suggests certain reforms in the financial system of Athens, and development of her internal resources, so as to secure a regular state support for all citizens, rich and poor, without being dependent on the tribute of the allies. He recommends that more foreign settlers should be attracted to the city, and a capitation tax imposed on them, and that more should be made of the silver-mines of Laurium; and lastly, that Athens should exert her influence in the settlement of disputes by diplomacy rather than by war.

The *Memorials of Socrates* have brought the author the reputation of being a philosopher; but they are really nothing more than sketches and dialogues without unity or coherence, illustrative of the life and character of his great master—a vindication of him by narrative rather than by argument, originally suggested by the publication of a declamation of the sophist Polycrates (392) in the form of an impeachment before his judges. Xenophon confines himself in this writing to the moral and practical side of his master's teaching, without venturing to enter into his metaphysical speculations, and so, as has been remarked, 'gives us less than the real Socrates, while Plato gives more.' The short allegory known as 'The Choice of Hercules at the Cross-road'—an abridgment of the famous apologue or *epideixis* of Prodicus—and the discourse on the evidence of a deity as displayed in the phenomena of the universe, are specially worthy of admiration. A less elaborate picture of Socrates is drawn in the *Symposion*, which belongs to the same group of works. The scene is laid at an entertainment given by the wealthy Callias in honour of a victory at Athens won by a youthful pancratiast. The table-talk of Socrates and the other guests, which turns on a variety of topics, and winds up with a philosophical disquisition by the former on the superiority of spiritual love over its sensual counterfeit, is diversified by the trifling of a professional jester, and the acrobatic and other feats of a boy and dancing girl brought by a strolling player from Syracuse. Xenophon's inferiority, as a thinker, to Plato is obvious in this dialogue, the vapid prose and the trivial commonplace of which are in marked contrast with the genial and high-flown speculations of Plato in his *Symposion*.

The *Oeconomicus* is the only Socratic dialogue that can bear comparison with those of Plato. It was intended to embody Socrates' ideas on the branch of economy which considers the relations of a family as distinct from those of a state. It begins with a conversation between Socrates and his favourite pupil, Critobulus, at which Xenophon was present, and slides off into a secondary dialogue, which is in fact only a recapitulation of another conversation once held between Socrates and Ischomachus, a wealthy Athenian proprietor, on the subject of family management, the former as the learner, the latter as instructor. The book presents an interesting picture of a Greek household, deals with the education of women, and the respective duties of husband and wife, and includes a graphic and characteristic account of the ordinary occupations of a country gentleman. In the management of labourers leniency is enjoined as preferable to harshness, and the need of active personal supervision is strongly insisted on.

The *Hieron*—one of the most pleasing of Xenophon's didactic compositions—is in the form of a dialogue between Simonides the famous lyric poet and Hieron, despot of Syracuse. Simonides advocates the popular view that a tyrant is, or ought to be, the happiest of men, and in spite of Hieron's arguments on the other side of the question that his lot is the most unenviable, maintains that it is quite possible for an enlightened tyrant, by a judicious and philanthropic exercise of his power, to be both a powerful and a popular ruler.

The *Apology of Socrates* is a short tract vindicating the attitude of Socrates during his trial and after the verdict, by showing that he really preferred death to life, and that it was his consciousness of his own innocence that prevented him from naming any punishment as due to the offence of which he was convicted.

The earliest printed edition of any of Xenophon's works is the Latin version of the *Cyropaedeia* by F. Philelfus (Rome, 1473). The *editio princeps* of the Greek text was that of Boninus, printed by P. Giunta (Florence, 1516), reprinted in 1527, followed by the Aldine in 1525. In the long list of subsequent editions of the whole or part of his works the most important names are those of Zeune, T. Hutchinson, Weiske, J. F. Fischer, J. G. Schneider, F. A. Bornemann, L. Breitenbach, K. W. Krüger, R. Kühner, G. A. Sauppe, L. Dindorf, K. Schenkl, F. K. Hertlein, Cobet, O. Keller (*Hellenica*), Zurborg, Arnold Hug (*Anabasis* and *Cyropaedeia*). There are editions with notes in English of the *Cyropaedeia*, *Hieron*, and *Oeconomicus* by the present writer, of the *Anabasis* by A. Pretor, and of the *Memorabilia* by J. Marshall. There are several lexicons, to the whole works by F. G. Sturz, to portions by G. A. Koch, K. W. Krüger, H. L. Strack, C. Thiemann, and F. Volbrecht. The work of Ad. Roquette, *De Xenophontis vita* (1884), and that of A. Croiset, *Xénophon, son Caractère et son Talent* (1873), are valuable contributions to Xenophontic literature.

Xeres, or (1) JEREZ DE LA FRONTERA, an important town of Spain, 14 (by rail 30) miles NE. of Cadiz, with a Moorish castle (*Alcazar*), a collegiate church, a handsome municipal building, and many large *bodegas* or wine-stores. It is the centre of the trade in Sherry (q.v.). The *Asta Regia* of the Romans, it owes its modern name to the Moors, who near by fought a seven days' battle and defeated Roderic, the last of the Goths, in 711. Pop. (1887) 61,708.—(2) XEREZ DE LOS CABALLEROS, 40 miles S. of Badajoz, is a picturesque old town, once a seat of the Templars (hence the name); parts of the castle remain, and much of the old Moorish wall. Pop. 8953.

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Xerxes I., king of Persia in 485–465 B.C., was the son of Darius and Atossa, and succeeded when Darius died in the midst of his preparations for a third expedition against Greece. He first subdued the rebellious Egyptians, then started with an army consisting of immense hordes of men from all parts of the vast Persian empire, and an enormous fleet furnished by the Phœnicians. He crossed the Hellespont by a bridge of boats, an English mile in length, and when the bridge was destroyed by a storm is said to have ordered 300 lashes to be given to the rebellious sea. Another bridge, consisting of a double line of boats, was built, and a canal cut through Mount Athos. The preparations were completed in 481 B.C., and in the autumn of that year Xerxes arrived at Sardis, where he wintered. Next year the vast assemblage began to march towards the Hellespont; it took, says Herodotus, seven days and nights to pass the bridge. After crossing the Hellespont the march was continued along the Thracian coast towards the plain of Doriscus on the Hebrus, where the army was numbered. Herodotus puts the whole number of fighting-men at 2,641,610; the ships of war at 1207, besides 3000 smaller vessels. This immense force moved on without resistance till it reached Thermopylæ (q.v.), where it was brought to a stand by Leonidas and his 300 Spartans. After these were all slain Xerxes marched onwards through Phocis and Bœotia, and on arriving at Athens in the summer of 480, three months after crossing the Hellespont, he found it deserted, and destroyed alike temples and houses. Meantime the two fleets had sailed round from Eubœa in the narrow strait between Salamis and the Attic coast, where took place the famous naval battle of Salamis (q.v.). Xerxes witnessed the fight from a lofty throne which he had erected. Confounded at the result of all his mighty preparations, he fled with all haste towards the Hellespont. Mardonius was left with 300,000 men to carry on operations in Greece, and his hopes of conquest died with him on the fatal field of Platæa (479 B.C.). Xerxes was murdered by Artabanus in 465, and was succeeded by his son Artaxerxes.

Xesibeland, between Griqualand East and Pondoland, was annexed to Cape Colony in 1886.

Xime'nes de Cisneros, FRANCISCO, cardinal-statesman, was born of an ancient but impoverished family at Torrelaguna, in Castile, in 1436. He was educated at Alcalá de Henares, Salamanca, and finally Rome, where he obtained from the pope a provisional or prospective nomination to the archpriestship of Uzeda in Toledo. The archbishop refused to admit him, and flung him into prison, where he lay for six years. On his release he was named Vicar-general of Cardinal Mendoza at Siguenza; but he suddenly threw up this preferment and the most brilliant worldly prospects to enter the Franciscan monastery of San Juan de los Reyes at Toledo (1482). His reputation for piety and learning led Queen Isabella to choose him for her confessor in 1492, and three years later to name him Archbishop of Toledo—a dignity which he refused to accept until he received an express command from the pope. Compelled to yield, he continued as archbishop the life of mortification and austerity of the monk, applying to purposes of religion and charity the whole of the princely revenues of his see; and even when admonished by the pope to maintain the dignity of his position, he hid the hair shirt of the ascetic under the gorgeous robe. As confessor and confidential adviser of the queen, Ximenes during the lifetime of Isabella was the guiding spirit of Spanish affairs; and on her death in 1504 he held the balance between the parties of Ferdinand and Philip of Burgundy, husband of Joanna, the heiress to the crown. On the death of Philip in 1506 Ximenes was appointed regent in consequence of the insanity of Joanna and the absence of Ferdinand, and he conducted the affairs of the kingdom through a critical time with consummate skill. In 1507 he was created cardinal, and next year he organised at his own expense, and himself accompanied as commander, the celebrated expedition for the conquest of Oran and extirpation of piracy, consisting of 10,000 foot and 4000 horse. Ferdinand died in January 1516, and on his deathbed named Ximenes regent of Spain till the arrival of his grandson Charles; and although the grandees had organised an opposition as well to himself as to the royal authority, the aged cardinal quickly overawed them into submission, and with the same vigour quelled the incipient revolt of Navarre. In September 1517 Charles at length landed on the soil of Spain, and Ximenes at once set out to meet him, but was seized with a mortal illness on the way, and died at Roa, November 8, 1517, probably before receiving the cold letter of Charles, which was equivalent to dismissal.

As a statesman and administrator Cardinal Ximenes showed inflexible determination and courage, but it is scarcely doubtful that his measures did a fatal injury to Spain, by building up to an excessive height the power of the crown, and by mercilessly crushing the conquered Moors. He was fanatical in his hatred of heresy, and as Grand-inquisitor is supposed to have caused the death of as many as 2500 persons. The social and political revolution he effected in breaking down the feudal power of the nobles has often been compared with the analogous change wrought in France by Richelieu. His munificence as a patron of religion, of letters, and of art has been the theme of praise in every history of his time. He founded and endowed the university of Alcalá de Henares, and published the famous Complutensian Polyglot—a magnificent undertaking, on which he expended half a million ducats (see Vol. VIII. p. 298). His expenditure on churches, hospitals, schools, convents, and other works of religion and benevolence, was on a scale of corresponding munificence.

The chief authority for his Life is the work by Alvaro Gomez de Castro, *De rebus gestis Francisci Ximenii* (1659). Other Lives are by Hefele (Tüb. 1844; 2d ed. 1851; Eng. trans. 1860) and Ulrich (1883).

Xylography. See WOOD-ENGRAVING.

Xyloidine, an explosive like gun-cotton, prepared by the action of strong nitric acid on starch or woody fibre.

Xylol, any of the metameric dimethyl benzenes. See AROMATIC SERIES.

Xylonite, a kind of Celluloid (q.v.).

Xylophaga. See BORERS.

X. Y. Z. Correspondence, in U.S. history, is the name given to the despatches of the three commissioners to France, Marshall, Pinckney, and Gerry (see Vol. VII. p. 63), containing the insulting demands made by Talleyrand and the other Directors as the price of respect and courtesy to the American republic. In the otherwise complete copies published by congress President Adams substituted X. Y. and Z. for the names of Talleyrand's emissaries.

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Y

the twenty-fifth letter of our alphabet, is derived from the Greek letter *upsilon* (see U), which had two forms, V and Y; the first was taken over to Italy with the original value (our *u* in 'rude'), which it still retains in Italian. In the classical age the Greek *upsilon* had acquired a thinner sound, nearly that of the French *u*, or the German *ü* in *über*, the digraph *ou* being employed by the Greeks to represent the older sound, which had been preserved in Latin. In the time of Cicero the symbol Y was borrowed by the Romans from Greece in order to transliterate the *upsilon* in Greek loan-words, the Greek *ou* and *ŏ* being transliterated by U, as in the word *Lycurgus*. That Y was introduced into Italy before Z is shown by the relative position of the two letters in the alphabet. Our English use of *y* is unique. Save in a few exceptional cases where it is used, as in Latin, to transliterate Greek words, such as 'hyperbola,' 'hydrostatics,' 'tyrant,' or 'hypocrite,' it is not descended from *upsilon*, but from the Greek *gamma; g* in Middle English assuming a form which became so nearly identical with that of *y* that ultimately it replaced it, just as the resemblance of *y* to the rune *thorn* has led to our writing *ye* instead of *the* (see ALPHABET). The history of this change is curious. With the other Latin letters *y* was introduced into the Anglo-Saxon alphabet, retaining its Latin value, an *i* pronounced with the lips somewhat rounded; a sound which has passed into *i* or the neutral vowel, as in the words 'birth,' 'wright,' 'hill,' 'king,' 'evil,' 'her,' or 'worm,' which were originally spelt with *y*. Hence as a matter of fact the Anglo-Saxon *y* has left no lineal descendant in any modern English word. Meanwhile another letter resembling the form of *y*, but representing a different sound, was being evolved out of the Anglo-Saxon *g*, which weakened before or after front vowels; and having thus acquired two values, its Anglo-Saxon form ȝ was conveniently used to denote the weak sound, the Caroline form, g, being reserved for the stopped *g*. In Middle English this decayed sound was represented by ȝ, and in the 15th century the written forms of ȝ and *y* approximated so closely as to be almost indistinguishable. Hence, early in the 16th century, after the introduction of printing, the form *y* came to be generally used instead of ȝ, the Anglo-Saxon vocalic *y* being ultimately replaced by *i*, or some other vowel. Thus we obtain the double value of *y* in modern English. In such words as 'ye,' 'yes,' 'yea,' 'yet,' 'year,' which represent the Anglo-Saxon *ge*, *gese*, *gea*, *git*, *gear*, the sign *y* is not really a *y*, but stands for the Middle English ȝ, which is the Anglo-Saxon form of *g*. A *y* appears before back vowels in 'young' and 'yard' owing to the loss of the front vowel in the Anglo-Saxon *geong* and *geard*. It has also been introduced by analogy into the words 'you' and 'yew,' from the Anglo-Saxon *eów* and *eow*, but not into the homophone 'ewe,' from the Anglo-Saxon *eówu*. In some modern loan-words, such as 'yacht,' 'yawl,' and 'Yakut,' it has been introduced to transliterate the continental *j*. The final *y*, so common in English, also represents an Anglo-Saxon *g*, as in the words 'lady,' 'army,' 'many,' 'busy,' 'empty,' 'body,' 'day,' 'key,' 'may,' 'say,' 'gray,' 'eye.' By analogy it has crept into words of a different origin, such as 'jolly' (Old Fr. *jolif*), 'tardy' (Fr. *tardif*), 'crockery,' 'jetty,' 'nunnery,' and 'mummy.' In 'by' and 'my,' and perhaps in 'sky,' it has been introduced from analogy with such words as 'dry,' 'fly,' and 'shy,' where the *y* is really the Middle English ȝ. In the 14th century a fashion set in of substituting the vocalic *y* for *i*. This fashion disappeared in the 16th century, leaving a trace in the *y* of *rhyme*, a misspelling for rime, which has been retained owing to the erroneous notion that it was a loan-word from the Greek *rythmos*, and not the Anglo-Saxon *rím*. Also by analogy *y* represents the final vowel in such Greek loan-words as 'academy' or 'irony.' Our peculiar consonantal sound of *y*, due as we have seen to the weakening of the Anglo-Saxon *g*, is unknown on the Continent, where its place has been taken by the evolution of a consonantal *j*, as in *jule* and *jahr*, our 'yule' and 'year.' Our own consonantal *j* is due to French influence, as in the words 'journey,' 'jest,' 'jewel,' 'Jane.' Italian has discarded *y*, replacing it by *i*. In other continental languages, with a few exceptions (such as the French pronominal *y*, derived from Latin *ibi*), it is normally used, as in Latin, for transliterating *upsilon* in Greek loan-words.

Y, THE. See AMSTERDAM.

Yablonovoi, or YABLONOI, a ridge of mountains in the north-east of Asia, dividing the basin of the Amur from that of the Lena. Some peaks are 7000 feet high, but parts of the ridge are a kind of plateau. See SIBERIA, ASIA (p. 486).

Yacht, a small sailing or steam vessel, decked (as distinguished from an open boat), and permanently fitted out and exclusively used for pleasure. Vessels answering the character of yachts were in use by royal personages in England from a very early period, but the name was first applied in 1660 when the Dutch presented a 'jacht,' named the *Mary*, to Charles II. Queen Elizabeth in 1588 had a royal yacht built at Cowes, Isle of Wight, and every succeeding English sovereign has had one or more yachts. In 1662 Charles II., who had a number of yachts designed and built for him by Sir Phineas Pett, is recorded to have matched for £100 a yacht of his own design against another, of Dutch build, under his brother the Duke of York.

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The first authentic record of a sailing club is in 1720, when the 'Cork Harbour Water Club'—now known as the 'Royal Cork Yacht Club'—was established. The vessels owned were small, and from that period till early in the 19th century yachting developed but slowly. In 1812, when there were probably about fifty yachts afloat, an association similar to the Cork club was established at Cowes by some fifty-five yachtsmen. Known first as 'The Yacht Club,' it continued steadily to

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when, having attracted the attention of William IV., then Duke of Clarence, its name was altered to 'The Royal Yacht Club,' and subsequently to 'The Royal Yacht Squadron,' the title by which it has since been known. Since 1820, and more particularly during the last half of the century, yachting associations have rapidly grown in numbers, strength, and popularity. There are now over forty 'royal' or 'recognised' yacht clubs distributed around the coasts of the British Isles, four-fifths of which have been founded since 1840. Most of the clubs are English, and are located chiefly on the Thames and the channel between Southampton and Isle of Wight. Some eight are Irish and ten Scottish; the most important of the latter being the Royal Northern, founded in 1824, having its headquarters at Rothesay, and the Royal Clyde (1856), at Hunter's Quay. The clubs which stand first as to number of members and yachts is the Royal Thames (1823), and the Royal London (1838). In foreign countries and in British possessions during recent years yachting has been growing in popularity. France, Germany, Austria, Holland, Belgium, Russia, Australia, and Canada have each yachting associations. In America yachting dates from only about 1844, in which year the New York Yacht Club was founded. In the first five years of its existence this was the only yacht club in the United States, and so late as 1870 only some fifteen clubs altogether were in existence. The history of this club in fact is practically the history of American yachting, for down to the year 1885 no other club—although the number had greatly increased—ever attempted anything more than mere local efforts. In the matter of organised squadron-cruising, ocean-racing, or private matches the New York Club has all along taken the lead, but during recent years Boston has in this connection shared the honours with New York.

From the year 1850, when there were only about 500 British yachts afloat, the increase in numbers has been immense, and the increase in size of individual vessels no less remarkable. The total number and tonnage of yachts owned in the United Kingdom in 1891, as recorded in Lloyd's Yacht Register, were sailing-yachts, 2428 of 59,795 tons; steam-yachts, 788 of 78,090 tons; or a grand total of 3216 vessels of 137,885 tons. The British colonies own 253 yachts, principally sailing, having a tonnage of 7193 tons. France owns a total of 476 yachts of 16,378 tons, of which 180 of 10,020 tons are steam-vessels. Germany and Austria own together 327 vessels of 5895 tons, of which 24, of 2825 tons, are steam-vessels. The grand total of the number of yachts belonging to all nations as recorded in the register is 6179 vessels, 1164 of which belong to America.

The materials used in the build of yachts are wood, iron, and steel; wood alone, wood and iron together (composite), iron alone, and steel alone being the several ways in which the materials are employed. Wooden yachts have their bottoms coppered to protect the planking and secure the smoothness of surface essential to speed. Lead, the use of which for ballast began in 1846, has since 1874 been adopted entirely for the purpose, in the form of lead keels forming an integral part of the hull. While speed, generally speaking, has always been the regulating condition of design, the other considerations determining the proportions, scantling, and build of yachts have fluctuated greatly throughout the course of their evolution, from the unpretentious rig and clumsy build of the small craft of the 18th century to the immense spread of sail and the rakish narrow model of the lengthier yachts of the present time. Prior to the advent in British waters in 1851 of the Club, the Cutter (q.v.), or 'national rig,' was much the most favoured by the British yachtsmen, especially for racing purposes. After the brilliant performances of that vessel, however, in winning, against fourteen rivals, the cup presented by the Royal Yacht Squadron for a race round the Isle of Wight, the attention of designers was forcibly drawn to the merits of the Schooner (q.v.) rig. The flat set of her sails was especially novel (in England it had been the practice till then to have them 'baggy'), and it is not too much to say that the lesson she taught the yacht sailors in the art of setting canvas has never been forgotten. The *America*, in fact, was a revelation, not only as regards rig, but in matters connected with the form and proportions of hull. Up to 1848 development had proceeded on conventional lines, but in that year a yacht of an entirely different type was built on the Thames. This was the iron cutter *Mosquito*, of 50 tons, the features chiefly distinguishing her being a long hollow bow and a short after-body of considerable fullness—a reversal, in fact, of 'the cod's head and mackerel tail' order of design then being disparaged by Mr Scott Russell, who advocated in its place his 'wave-line theory.' This marked deviation from orthodox lines, however, did not meet with ready acceptance, and prejudice was still strong when the success of the *America* forcibly shook English yachtsmen out of their complacency. Her model partook of the very features then being advocated, and copies of her and of the schooner style of rig became quite the rage in new yachts, both for racing and cruising purposes; even existing cutters being lengthened in the bows to give them the hollow contour in vogue. This movement notwithstanding, the cutter style of rig has held its own, the number of such craft being always on the increase. Since 1864, when the yawl (see SAIL) rig assumed importance, and especially during the past few years, the cutter has again decidedly become the favourite rig, not only for racing purposes, but—above 40 tons—for cruising as well. The labour and expense connected with racing a schooner are so very much greater than with a cutter or yawl, that there is but small likelihood of the former again coming into favour.

American yacht designers have in turn benefited from British example. In 1881 the 10-ton cutter *Madge*, designed by G. L. Watson of Glasgow, was sent across the Atlantic, and it is not too much to say that her performances in American waters established the cutter model in that country on a firm foundation, modifying the American centre-board model, and resulting in a yacht with the depth, the outside ballast, and in part the rig of the cutter, retaining still the advantage of beam and centre-board. Centre-board yachts are of restricted depth, displacement, and draught, and have the effective area for lateral resistance to avoid leeway made up by a 'shifting keel' or 'centre-board,' fitted to drop below and in line with the keel proper. When made of heavy material, centre-boards also serve to impart stability to a vessel while under press of canvas. They are, as a rule, pivoted at the fore-end, and drop, like a fin, towards the aft extremity, and are either rigid and housed in a well inside the vessel, or made collapsible, like a fan, and carried alongside the keel. The idea of their use is traced to the old Dutch lee-boards—boards attached one to either side of flat-bottomed boats, one or other being let down as may be needed to check drifting. The exigencies of American yachting waters, if they did not suggest, have at least favoured the development of this class of yacht from the beginning of yachting there. It is, however, only since the interest in American yachts which the visit of the *America* and

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subsequent international contests engendered, that British designers have studied the centre-board and one or two notable centre-board yachts have been tried.

The necessity for time allowances in races where yachts of different sizes and spread of sail are matched together, and the efforts at classifying and differentiating them according to a given rule for measurement of Tonnage (q.v.), largely account for fluctuation in design. System and uniformity in these matters have been, on the whole, well attained since 1875, when the Yacht Racing Association was established with the object mainly of providing one code of sailing rules in all matches, and of deciding such disputes as might be referred to the council. This association in fact bears much the same relation to yachting that the Jockey Club does to horseracing. It adopted the rule for ascertaining the size or tonnage of yachts which had been in use for a very considerable period, known as the 'Thames Rule,' because first employed there. It was based upon and a modification of the well-known 'Builder's Old Measurement' rule, in which the length and breadth only were factors. In operation this rule was found to favour length and depth at the expense of breadth. The absence of restriction on depth and the penalty put upon beam engendered a deep narrow type of vessel, which, although admirable for sea-going qualities, caused difficulties in competitive sailing. Thus vessels of extreme length, depth, and narrowness, which were kept up by enormous masses of lead on the outside of the keel, were enabled to compete on equal terms with vessels of greater proportionate width, less depth, and less spread of sail. Such anomalies led to minor modifications on the rule, and finally in 1885 to its entire relinquishment in favour of a rule of measurement or 'rating' which takes account only of length on water-line and area of sail carried. This has left naval architects a freer hand in the matter of adopting either a long and narrow or a short and 'beamy' boat, with appropriate ballasting. In this way a set of yachts have been created which besides being splendid as racing craft are also admirable sea-boats, and well adapted for cruising when their butterfly life as racing clippers is ended. Notwithstanding this, the rating rule which has been in use since 1885 has been subject to criticism from owners and designers of the smaller classes of yachts, on which the rule has operated hardly. It has been pointed out, for instance, that the tax on sail area should be abolished, because in heavy weather a lengthy boat with diminished canvas can run away from a rival—a 'poor man's boat' probably—who has sacrificed length to a spread of canvas only possible in light breezes.

International yacht-racing—or contests between yachts built and owned in different countries—is the highest and most generally interesting form which the sport can assume. It may be said to date from 1851, the year of the Great Exhibition, when, as before related, the famous schooner *America* bore away the trophy presented by the Royal Yacht Squadron at Cowes. Commodore Stevens, the owner of the *America*, died in 1856, and by a deed of gift set the cup apart as 'a perpetual challenge for friendly rivalry between foreign countries.' This trophy has come to be regarded as the emblem of the supremacy of the seas—in a yachting sense—its possession having been frequently contested. In 1870 the *Cambria*, owned by Mr James Ashbury, made an unsuccessful attempt to bring back the cup to England, as did the same owner's *Livonia* in the following year; the latter vessel being built expressly for the task, and the whole effort involving an outlay of £22,000. The Canadian schooner *Countess of Dufferin* in 1876, the *Atalanta* in 1881, the *Genesta* in 1885, and the *Galatea* in 1886 each made futile efforts to defeat the American representatives, as also in 1887 did the *Thistle*, a steel cutter built on the Clyde expressly for the purpose from the designs of G. L. Watson, for a syndicate of Scottish yachtsmen, headed by Mr James Bell of Glasgow. Prior to this vessel's departure for America she proved her superiority over all English yachts, and on starting across the Atlantic sported eleven winning flags. Meanwhile the Americans had built, expressly with a view to meet the Scotch cutter, the centre-board sloop *Volunteer* from the designs of Edward Burgess. The exciting contest between these two vessels took place in New York Bay on the 27th and 30th September, the *Volunteer* winning on the first occasion by nearly nineteen minutes, and on the second by ten minutes. There have been frequent proposals for a renewal of the contest with a yacht conforming more to the type of centre-board yacht.

Foremost amongst events to commemorate Queen Victoria's Jubilee in 1887 was the Royal Thames Yacht Club race round the British Isles for a prize of 1000 guineas. The Royal Yacht Squadron gave £800 for a Channel match, and the Royal Victoria and Royal London Yacht Clubs also offered rich prizes. The *Irex* (80 tons), owned by Mr J. Jamieson, during the 1887 season won seventeen first prizes and six second, out of thirty-four starts, the gross value of her winnings being £1789. The *Genesta* (80 tons), which won the £1000 prize in the Jubilee race round the British Isles, also bore away twelve other prizes, and amassed the substantial sum of £1355, her record being four first and nine second prizes. Against these figures, however, must be set the expenses of racing, which are very great; amounting in the case of an 80 or 100 ton cutter to fully £2000 or £3000 a year. The expenses of cruising yachts are of course not so heavy; the crew is neither so numerous nor so highly paid, the breakage of spars and tearing of sails are not so frequent, and there are no entrance fees nor 'winning money' to pay over.

While the growth, since 1850, of the world's pleasure-fleet of sailing-yachts has been remarkable, the increase of steam-yachts has been still more wonderful, in spite of the antipathy with which they were long regarded by racing yachtsmen. In 1850 there were not more than four or five steam-yachts—properly so called—afloat. Lloyd's Register for 1891–92 shows a total afloat of about 150 steam-yachts above 300 tons—55 being over 500 tons and a dozen over 1000 tons. The rapidity with which they have grown into favour for cruising is easy of explanation. Yachts mechanically propelled are independent of wind, and can traverse the sea to any desired point when the sailing craft is lying helplessly becalmed. Large steam-yachts can keep the sea practically all the year round and go enormous distances. The largest of the modern steam-yachts are 'auxiliary' in character—i.e. fitted with steam-engine and screw-propeller in addition to the ordinary spread of sails. Their prime cost and the cost of upkeep and management are, however, enormous, and their possession is beyond all but the wealthiest owners.

Yachting has been encouraged by government, as affording an excellent training for seamen who in time of war become available for the royal navy. The first Royal Cup was presented in 1834 by William IV. to the Royal Yacht Squadron, a gift which has been continued ever since, and in recent years supplemented by similar gifts to other clubs. Warrants are granted by the Admiralty to members of clubs to fly the white, blue, or red ensign, with device upon it, when the yachts are registered according to the provisions of the Merchant

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Shipping Acts. These warrants carry with them certain privileges, such as exemption from excise duties and harbour and anchorage dues. The master or mate need not have Board of Trade certificates, and the yacht's name need not appear on her stern—although in both these cases the privilege is of doubtful utility.

See Dixon Kemp, *Yacht Architecture* (2d ed. 1891); *Manual of Yacht and Boat Sailing* (7th ed. 1891); E. Burgess, *English and American Yachts* (1888); C. P. Kunhardt, *Small Yachts* (1885), and *Steam Yachts and Launches* (1888); and the annual *Lloyd's Yacht Register* and *Yacht Racing Calendar;* also the articles BOAT, SHIPBUILDING.

Yak (*Bos grunniens*), a species of ox found in Tibet, and domesticated there. The wild yak of central Asia is the largest native animal of Tibet, and is found only near the limits of perpetual snow, descending into the higher wooded valleys in winter, and ascending in summer to the pastures of short grass, some of which are at an elevation of 17,000 feet above the sea. It is very fierce, falling upon an adversary not only with its horns but with its chest, and crushing him by its weight. The domesticated yak, which forms great part of the wealth of the inhabitants of the highest and coldest regions of central Asia, is about the height of an English ox, which it much resembles also in body, head, and legs; but it is covered all over with a thick coat of long silky hair, that of the

Yak (*Bos grunniens*).
(From a Photograph by Gambier Bolton, F.Z.S.)

lower parts of the body being very long and hanging down almost to the ground. The neck is short; the rump is low; the legs are short. Over the shoulders there is a bunch of long hair; and the tail is covered with a prodigious quantity of long flowing hair. Black and white are the most prevalent colours. The great quantity of hair gives the yak an apparent size far beyond the reality. Its characters seem to bridge over the gulf—not a very wide one—between the sheep and oxen. The yak does not low like an ox, but utters a short grunting sound. Its milk is very rich, and yields excellent butter and curd. The yak is never used for tillage or draught, but as a beast of burden travels twenty miles a day. The hair is spun into ropes, and made into coverings for tents; the soft fur on the hump and shoulders is made into a fine and strong cloth. The yak seems suitable to Norway and Iceland, and perhaps even to the Highlands of Scotland.

Yakutsk, chief town of a government in Eastern Siberia, on a branch of the Lena, and about 4 miles from the main stream. It has a cathedral and several churches, and there are a few merchants trading in hides, furs, and mammoth tusks. Pop. 5300. The dreary government of Yakutsk consists of the basin of the Lena River, and has an area equal to four-fifths of European Russia (see RUSSIA). The Yakuts (see SIBERIA) are of Turkish stock.

Yale University, one of the leading institutions of learning in America, situated at New Haven, Connecticut, was founded at Saybrook in 1701 as the collegiate school of the colony, under the trusteeship of the ten principal ministers, and in 1718, when it was removed to New Haven, named after Elihu Yale (1649–1721), a Boston (Mass.) man, who had been governor of Fort St George, Madras, acquired great wealth, and sent the young institution gifts of money and books to the extent of £800. The name Yale College, applied at first only to the new building, was given formally to the institution in its charter of 1745. A chair of Divinity was added in 1755, and another of Mathematics, Physics, and Astronomy in 1771, though this was not permanently filled till 1794. Occasional grants were made by the legislature before the Revolution, and $30,000 was voted by the state in 1792. Schools of medicine (1812), theology (1822), and law (1824) were established; and, as reorganised in 1871, the university possesses also departments of philosophy and arts, the latter including, besides the classical course of 'Yale College' proper, the Sheffield Scientific School (begun 1847, endowed 1869), post-graduate courses, and a school of fine arts (1864). A great part of the studies in the third and fourth years is elective. The students number over 1200, half of them in the college proper; there are over seventy professors and fifty tutors and lecturers. Among the presidents have been Timothy Dwight and his grandson, T. D. Woolsey, and Noah Porter; and the two Sillimans were professors of Chemistry from 1802 to 1885. The library contains some 200,000 volumes; in 1891, 8700 vols. and some 22,000 pamphlets were added. The numerous buildings cover some 9 acres in the heart of the city, the oldest dating from 1752, and others including the School of Fine Arts, where the Trumbull (q.v.) paintings are housed, the Peabody Museum (1866), the observatory, the Sloane Memorial physical laboratory (1884), Lawrence and Dwight halls (1886), and the Kent chemical laboratory.

See Clap's *Annals of Yale* (1766), Professor Kingsley's *History* (2 vols. 1879), and that by Professor F. B. Dexter; also Professor D. C. Eaton's anonymous *Yale College in 1883* (New Haven, 1883).

Yam (*Dioscorea*), a genus of plants, of which the species are mostly tropical, natives of the West Indies, Polynesia, China, &c. They have tuberous roots and herbaceous twining stems. The great fleshy roots of some of them are very much used as an article of food, in the same way as potatoes in more temperate climates. They contain much starch, and generally become somewhat mealy and pleasant to the taste when boiled. This, however, is not the case with all: the roots of *D. triphylla*, *D. dæmonum*, *D. virosa*, and several other species with ternate leaves are very nauseous, even when boiled, and are poisonous. The tubers of all the yams contain an acrid substance, which, however, is dissipated by boiling, except in the species with compound leaves. The roots of the Winged Yam (*D. alata*) of Polynesia are 1½ to 3 feet long, and often 30 lb. in weight, with a brownish or black skin, juicy and reddish within; they vary exceedingly in form. The stem, which is winged, twines up tall poles. Two or three small tubers are generally found in the axils of the leaves. It is supposed that this species may be the original of most, or perhaps all, of the yams cultivated in the tropical parts of Asia, Africa, and America—as the common yam of the West Indies (*D. sativa*),

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D. bulbifera, in which the tubers in the axils of the leaves attain the size of apples; the Prickly Yam (*D. aculeata*); *D. globosa*, the most esteemed yam of India, which has very fragrant flowers, and roots white internally; *D. rubella*, another Indian kind. Yams are propagated by means of their tubers; the small axillary tubers, or the small tubers produced at the base of the stem around the neck of the large tuber, being used for this purpose. A species of yam (*D. batatas*) brought from the temperate parts of China is found to succeed well in France. It is hardy enough to endure the climate even of Scotland without injury; but the heat of the summer is not sufficiently great, so that, in general, the plant merely lives, without producing a large tuber. The stem requires the support of a pole, round which it twines; the leaves are more elongated and acuminated than those of the West Indian yams; the root strikes perpendicularly down into the ground, and forms its tuber often at a very considerable depth; this may be prevented by putting a slate under it. The true yam is little cultivated in the United States, where the name is often given to the Sweet Potato (q.v.). See also COCCO.

Yam (*Dioscorea sativa*): *a*, a flower; *b*, root.

Yanáon (Yánám), a small patch of Indian soil belonging to France, and under the governor of Pondicherry, forming a small enclave surrounded by British territory (province of Madras), with 3½ sq. m. of area and 4470 inhabitants. It lies near the mouth of the Godavari, between the main stream and its branching mouth, the Coringa.

Yanbu', or YEMBO. See MEDINA.

Yang-tsze-kiang (better simply *Kiang* or *Chiang*), the longest and most important of Chinese rivers, affording a waterway, not unbroken by rocks and rapids, across the breadth of China from Tibet to the sea, rises in the mountains of Tibet, where its sources were explored by Prejevalsky in 1884–85, and after a course of 3200 miles (south-east, north-east, and east) through Yunnan, Sze-chwan, Hu-pei, An-hui, and Chiang-su, reaches the sea by a wide estuary which begins 50 miles below Nanking, and may be held to terminate near Shanghai. On its banks are, besides Nanking, the important towns of Chin-kiang, Ngan-king, Hankow, Wu-chang, Ichang, and Chung-king (opened to European commerce by treaty in 1890). Some of its many tributaries are over 1000 miles long; its basin is estimated at 689,000 sq. m. Its importance for commerce is enormous, though the navigation is in places difficult even for the native boats, which have to be shoved and poled through the narrow gorges against a strong current. Steamers run in the lower parts. See CHINA (Vol. III. p. 184); and A. J. Little, *Through the Yang-tse Gorges* (1888).

Yanina. See JANINA.

lander in America, and in Great Britain often applied indiscriminately to the whole population of the United States, has often been explained as in its origin a corruption of the word English as pronounced by the Indians (Yenghies, Yanghies, Yankees). It was in use in Boston about 1765, but is claimed to have circulated in Cambridge slang as early as 1713, with the sense of 'excellent.' If so, it is the same word we meet in Scotch *yankin*, 'active,' *yank*, 'a sharp stroke.' The Southern population apply the name to Northerners generally. For 'Yankee Doodle,' see NATIONAL HYMNS.

Yankton, capital of a county of that name in South Dakota, and prior to 1883 capital of the territory of Dakota, stands on the north bank of the Missouri, nearly 200 miles above Omaha, and 569 miles by rail W. by N. of Chicago. It contains mills and breweries, railway-shops, and grain-elevators, and has a busy river trade. Pop. 3670.

Yapock (*Chironectes palmatus*), an aquatic marsupial quadruped of the Opossum family, Didelphyidæ, the only known species of its genus. It occurs from Guatemala to southern Brazil. Its food consists of small fishes, crustaceans, and the like. The feet are webbed for adaptation to the aquatic habits. In size the yapock is rather larger than a rat; the general colour is light gray crossed by transverse bars of brown.

Yard (A.S. *gyrd*, *gierd*, 'rod'), the British standard measure of linear dimension (see WEIGHTS AND MEASURES). The yard contains 3 feet, and each foot 12 inches. Yard and Ell (q.v.) are often, but erroneously, treated as identical. The military pace is 2½ feet.

Yarkand, the commercial capital of Eastern Turkestan, on the Yarkand or Zerafshan River, about 100 miles SE. of Kashgar; pop. 60,000. It was visited by Marco Polo, but was hardly known till R. Shaw in 1871 published an account of his residence there three years before. The oasis in which it stands is very fertile, and there is great wealth of minerals in the mountains within view of it. See TURKESTAN and books quoted there.

Yarmouth, a municipal, parliamentary, and county borough, seaport, watering-place, and fishing-town of Norfolk, 20½ miles E. of Norwich and 122 NNE. of London. It stands 2½ miles above the mouth of the river Yare, on a slip of land 1½ mile broad, which is washed on the west by the Yare, expanding here into Breydon Water, and on the east by the German Ocean. A bridge connects the town with its Suffolk suburbs of Southtown, or Little Yarmouth, and Gorleston. The main streets of Yarmouth run parallel to the river, and are intersected by 145 narrow 'rows,' resembling the 'wynds' of Edinburgh. The sea frontage has a fine marine parade, with the Wellington and Britannia Piers (1854–58) and the Old Jetty (1808). St Nicholas' Church, founded by Bishop Herbert de Losinga, and restored between 1847 and 1884, is one of the largest parish churches in the kingdom, measuring 230 feet in length, 110 in breadth, and 148 across the transept, with a modern spire 168 feet high; a feature of its churchyard is the number of gravestones to drowned mariners. The Nelson Monument (1818) is a Doric column 144 feet high; and one may also notice the new municipal buildings, Queen Anne in style (1882), the covered fish-market (1867), the sailors' home (1860), the aquarium (1876), the royal military hospital (1809), militia barracks, spacious market-place, some remains of the old walls, &c. Yarmouth is the principal seat of the English herring-fishery; and its 'bloaters' are widely esteemed. Deep-sea fishing is also carried on, and there is considerable shipping, the present harbour-channel

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of the Yare having been formed in 1559–67, whilst in Yarmouth Roads, inside a line of sandbanks, there is safe anchorage. The exports include fish and agricultural produce; shipbuilding is carried on, and iron, ropes, sails, silk, &c. are manufactured. The town, too, owes much of its well-being to its attractions as a lively watering-place. None of its worthies is more famous than 'Peggotty;' in its history may be noticed its feuds with the Cinque Ports, the plague of 1338–39, which cost 7000 lives, and the fall of a suspension bridge (1845), when seventy-nine persons were drowned. Chartered by King John, it returned two members to parliament from Edward II.'s time till 1867, and regained one of them in 1885; in 1888 it was created a county borough. Pop. (1881) 46,767; (1891) 49,318.

See works by C. J. Palmer (1856), J. G. Nall (1860–66), W. F. Crisp (1871), and others cited at NORFOLK.

Yarmouth, a small seaport in the north-west of the Isle of Wight, 10 miles W. of Newport. It was once an important fortified place, and till 1832 sent two members to parliament. Pop. 800.

Yarn. See COTTON, WOOL, THREAD, &c.

Yaroslav. See JAROSLAV.

Yarrell, WILLIAM, naturalist, born at Westminster in June 1784, was originally a newspaper agent, but, a keen sportsman, soon devoted himself to zoological work, contributing largely to the Transactions of the Linnean and other societies. He died 1st September 1856. His chief works are *The History of British Fishes* (2 vols. 1835–36; 3d ed. 1859) and *The History of British Birds* (3 vols. 1839–43; 4th ed. 1881–85).

Yarrow, a Scottish stream famous in song and ballad, that rises at the meeting-point of Peebles, Dumfries, and Selkirk shires, and flows 25 miles north-eastward till it joins the Ettrick, 2 miles above Selkirk town. About 5 miles from its source it expands into first the Loch of the Lowes (1 by ¼ mile) and then St Mary's Loch (3 by ½ mile; 814 feet above sea-level), the two being separated only by a neck of land on which stands Tibbie Shiels's hostelry. Under SELKIRKSHIRE have been noticed a few of the many memories of that hill-girt lake and the deep swirling stream; and reference may be also made to BALLAD and to Borland's *Yarrow, its Poets and Poetry* (1890), the poets including Hamilton of Bangour, Logan, Hogg, Scott, and Wordsworth.

Yassy. See JASSY.

Yates, EDMUND, journalist and novelist, was born at Edinburgh, 3d July 1831, the son of the actor Frederick Henry Yates (1797–1842), who from 1825 was manager of the Adelphi Theatre. He was educated at Highgate and Düsseldorf, and from 1847 till 1872 had a berth in the Post-office, being for ten years chief of the missing-letter department. Since 1854 he has published upwards of a score of novels and other works (*Broken to Harness, Running the Gauntlet, Black Sheep*, &c.), has been editor of *Temple Bar, Tinsley's*, and other periodicals, and in 1874 founded, with Grenville Murray (q.v.), a very successful 'society' weekly, *The World*, of which next year he became sole proprietor, and which, for a libel on Lord Lonsdale, involved him in 1884 in two months' imprisonment. See his lively *Recollections* (2 vols. 1884), with anecdotes of Dickens, Thackeray, Albert Smith, &c.

Yawl. See SAIL, YACHT.

Yawning either may be the simple result of deficient aeration, or may be brought on by the mere sight of the act in another person, and is a modification of the ordinary movements of respiration, in which the inspiration is deeper than usual, and is accompanied by a kind of spasmodic contraction of the muscles which depress the lower jaw, and by a great elevation of the ribs and to some degree of the shoulder-blades. 'The purely involuntary character of the movement,' says Dr Carpenter, 'is sometimes seen in a remarkable manner in cases of palsy, in which the patient cannot raise his shoulder by an effort of the will, but does so in the act of yawning. Nevertheless, this act may be performed by the will, though not completely; and it is one that is particularly excited by an involuntary tendency to imitation, as every one must have experienced who has ever been in company with a set of yawners.'

Yaws is a disease also called Frambœsia; Button Scurvy; Verruga Peruviana; Peruvian Wart; Buba or Boba, and Patta (West Indies); Framosi (Calabar); Tetia (Congo); Tonga or Coco (Fiji); Lupani and Tono (Samoa); Fr. and Ger. Pian. It is an epidemic and contagious disease, consisting of an eruption of yellowish or reddish-yellow tubercles, which gradually develop into a moist exuding fungus without marked constitutional symptoms, or with such only as result from ulceration and prolonged discharge—i.e. debility and prostration. Incubation varies from three to ten weeks, and yaws usually only occurs once in the same individual. Yaws is distinctly a tropical disease, depending for its origin on extreme heat and moisture, although there must be other causes necessary for its production, as in India, for example, where the same temperature and moisture exist as in countries where it is endemic, it is unknown. Negroes chiefly suffer from it, but no race is exempt. In Africa yaws is found on the west coast from Senegambia in the north to Angola in the south. It obtains all over the western Soudan, and is more rarely seen in the Nile valley and on the northern and north-eastern African coast-line. It is found in Madagascar, Mozambique, in the Moluccas, Java, and Sumatra. It is also endemic in Ceylon, New Caledonia, Fiji, and Samoa; and in the West Indies in San Domingo, Jamaica, Barbadoes, Martinique, Guadaloupe, Sta Lucia, and Dominica. It exists all over Brazil and in Guiana; also at Punta Arenas in Costa Rica. The duration of the disease is from two to six months, but if neglected it may last for several years. If the course of the disease is protracted, the joints are apt to swell, and ulcers form around them, from which an excessive discharge rapidly undermines the patient's strength. The treatment consists of tonics, iodide of potassium, and a generous diet. The patient must be kept very clean, and local applications made either of dilute nitrate of mercury ointment, carbolic acid, sulphate of copper, or sulphate of iron lotions. It should be remembered that the discharge from the sores is capable of producing a fresh crop of yaws in adjacent parts.

Ya'zoo City, capital of Yazoo county, Mississippi, on the Yazoo River (a tributary of the Mississippi), 45 miles by rail N. by W. of Jackson; pop. 5247.

Yeadon, a town of the West Riding of Yorkshire, England, on the Aire, 6 miles NW. of Leeds by rail, with woollen manufactures. Pop. (1881) 6534; (1891) 7396.

Year. The origin of this division of time, its duration, and the history of its changes are discussed under CALENDAR. For the ecclesiastical year, which in Europe generally commenced on 25th March, see CHRONOLOGY. In Astronomy there are several kinds of years depending upon the various configurations of the earth in its orbit, and consequently varying in length. First there is the *tropical* or (as it is sometimes incorrectly called) *solar* year, which, from its being recognised in legislation and history, and commonly applied in the measure of time, has also received the name

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which elapses from the sun's appearance on one of the tropics to its return to the same, and has a mean length of 365·2422414 mean solar days, or 365 days 5 hours 48 minutes 49·7 seconds. Next is the *sidereal* year, which is the period required by the sun to move from a given star to the same star again, and this year, affected as it is by Nutation (q.v.) only, is one of the most invariable quantities which nature presents us with, and has a mean value of 365·2563612 mean solar days, or 365 days 6 hours 9 minutes 9·6 seconds. The time which elapses between the earth's arrival at its Perihelion (q.v.) and its return to the same position is known as the *anomalistic* year, and is equivalent to 365·2595981 mean solar days, or 365 days 6 hours 13 minutes 49·3 seconds. The *canicular* year—the ancient Egyptian—was counted from one heliacal rising of Sirius to the next. The canicular cycle was the cycle of 1461 years of 365 days each, or 1460 Julian years, also called the *Sothiac* period.

Yeast, the vegetable growth to which Fermentation (q.v.) is due, of value in brewing, baking, &c. Yeast drained and pressed till nearly dry—German barm—may be kept for months. See BEER, BREAD, SUGAR, WINE.

Yedo. See TOKYO.

Yeisk, or EISK, a seaport of the Russian province of Kuban, near the mouth of a small feeder of the Sea of Azov. Pop. 23,500.

Yekaterinburg. See EKATERINBURG.

Yelisavetgrad. See ELIZABETGRAD.

Yell, one of the Shetland Islands (q.v.).

Yellala Falls, the lowest of a series of falls or rapids which interrupt the navigation of the Congo (q.v.) near Vivi, 110 miles from the mouth.

Yellow Bird, a name in the United States of a familiar Warbler (q.v.), and of a goldfinch.

Yellow Fever is also known as Yellow Jack, Bronze John, El Vomito (Span.), Fièvre Jaune (Fr.), Gelbes Fieber (Ger.), Vomito Prieto or Vomito Amarilli (Central America). It is a pestilential, contagious fever of a continuous and special type, presenting at least two well-defined stages, the first occupying 36 to 150 hours, marked by a rapid circulation and high temperature, the second being characterised by general depression and black vomit; as a rule it occurs but once in the same individual. Negroes and Mongolians are little susceptible to yellow fever, and it is noteworthy that strangers are the more liable to be attacked the farther north or south from its area they have been born. New arrivals in an endemic area are most liable to contract the disease; should they escape it at first, they are less liable to suffer from it the longer they reside in one place; should they, however, travel about, they lose what protection they may have gained. The area of distribution of yellow fever is limited. Its endemic areas are on the seacoasts and along the banks of the great rivers in the West Indies, on the Mexican part of the Gulf coast, and on the Guinea coast of Sierra Leone. Epidemics, however, may extend from these foci, but their distribution is limited in Africa to the west coast, from 19° N. to a point on the mainland opposite Fernando Po; in the western hemisphere, from 38° N. to 32° S. lat.—though on the western shores of South America epidemics have occurred from 5° S. to 42° S. They also occur throughout the whole of the West Indies. For the production of yellow fever a dense population is necessary, as also a temperature of above 70° F., a moderate amount of moisture in the atmosphere, and a low altitude. An epidemic of yellow fever will be cut short if ant rains frequently bring an epidemic to an end. As a rule yellow fever does not ascend higher than 3000 feet above sea-level. Domingo Freire of Rio Janeiro believes that a micro-organism (which he calls the cryptococcus xanthogenicus, or micrococcus amarilli) is the cause of yellow fever, but further observations are necessary to substantiate this. The yellow-fever poison can be transported farther by sea than on land, and may be carried by clothing, bedding, &c., which may retain the poison for a considerable time. The symptoms of the disease may be briefly described as follows: The patient usually suffers for two or three days from loss of appetite, lassitude, and discomfort. Then suddenly he will be attacked by severe rigors, alternating with flushes of heat. There is violent headache, the pulse is regular but throbbing, thirst is usually severe; the tongue, coated in the centre, presents a red edge, and deep-seated pain at the back of the eyeball is almost invariably complained of. Constipation, which obtains throughout the disease, should be noticed, and the patient vomits at short intervals. The skin assumes a yellowish or livid colour, and is covered by cold perspiration. The urine is acid and contains a large amount of albumen. The respirations are frequent, and the temperature is about 105° or 106° in the axilla. On the third or fourth day the vomiting becomes more distressing, the urine is scanty or may be suppressed, the temperature rises still higher, and the skin grows harsh and dry. The skin becomes exceedingly yellow, and may be even the colour of mahogany. The face is flushed, the conjunctivæ injected, and the eyes are protruded. The vomited matter at this time is limpid, slightly opalescent, and acrid; it is called the white vomit. The patient is very distressed and often delirious.

At this point the condition of the patient will improve somewhat, and in rare cases convalescence may set in, but as a rule the improvement only lasts from eight to twenty hours, during which period all untoward symptoms subside, with the exception of a certain amount of gastric irritation. If these favourable symptoms do not continue, the patient sinks into a state of extreme prostration; pains in the head, the orbits of the eyes, the loins, and joints return, the pain in the stomach being so severe that the patient can hardly endure the weight of the bedclothes. The tongue becomes parched and grey, the gums and teeth black with sordes, the lips dry, brown, and bleeding, and then the terrible 'black vomit' (*vomito negro*) sets in. At first it may be of a bright red colour, but it soon becomes a deep, brownish black. The patient may vomit thirty or more times in the twenty-four hours. This characteristic vomit is produced by severe irritation. The disease may terminate in various ways, the mortality varying from 10 to 70 per cent. Death may result from the direct action of the poison upon the blood and nervous system, or from suppression of the functions of the liver or kidneys, from syncope due to fatty degeneration of the heart, or from hæmorrhage. In rarer cases pyæmia may ensue and the patient succumb to blood-poisoning.

The treatment of yellow fever may be considered under two heads: (1) prophylactic; (2) curative. Hitherto no prophylactic treatment has been proved of any avail, but Freire claims that inoculation with an attenuated virus will in most cases render patients insusceptible to yellow fever. At the end of 1891 he had inoculated some 10,000 persons, and less than 2 per cent. had suffered from the fever. After the inoculations the patients suffered from slight malaise for two or three days. Finlay of Havana used the mosquito for inoculating healthy individuals with yellow fever, and such apparently

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observers. The curative treatment of yellow fever presents innumerable difficulties, and it must be remembered that drugs which are successful in one epidemic are apparently useless in another; therefore the general lines of treatment alone can be indicated. The patient should be kept in bed in the recumbent position; each patient requires 2000 cubic feet of space; draughts should be avoided, and the temperature should be carefully regulated; the patient should be warmly but lightly clad, heavy bedclothes being avoided. We know of no drug which will arrest yellow fever, and quinine is useless unless malaria should complicate the fever. It follows, therefore, that symptoms must be combated as they arise. Calomel and jalap and sweet nitre are useful, as are stimulating frictions over the spine and lower extremities. Hot-air baths are also useful, especially if there is any tendency to suppression of urine. The patient's thirst may be relieved by iced water or ice, and the irritability of his stomach may often be allayed by the administration of dilute hydrocyanic acid. The black vomit will be best controlled by the administration of turpentine and sulphuric ether. Opium may be used to alleviate pain if the kidneys are acting freely. Hyperpyrexia must be combated by the administration of aconite, or by sponging the body with cold water. The diet must be light and nutritious, and should be given in small quantities at regular intervals throughout the disease. It should consist of chicken-broth, beef-tea, corn-flour, barley-water, or iced milk and lime-water, all solid food, even bread, being best avoided. For the suppression of the urine perhaps the best treatment is the administration of an enema of iced cold water. During convalescence the bowels must be kept open, light and nourishing diet with small doses of brandy should be given, or if preferred, the patient may take port wine. If during the course of yellow fever the prostration is very great, alcohol will be necessary, but in moderation; champagne is the best form in which to administer it.

Yellow-hammer, or YELLOW-BUNTING (*Emberiza citrinella*), a species of Bunting (q.v.), common in the British Isles, most parts of Europe,

Yellow-hammer (*Emberiza citrinella*), with Nest and Eggs.

and Asia Minor and Persia. It is of a somewhat short, thick form, about 6½ inches in entire length. The male's summer plumage is brilliant, bright lemon yellow (especially on head, cheeks, chest, &c.), contrasting with chestnut and dusky black. The tail is slightly forked, and is shorter than that of the common bunting. The female has much less yellow about the head than the male, and her plumage is altogether much less vivid. The bird's food consists of insects, blackberries or near the ground, under shelter of a bush or a bank, forming it of moss, dry grass, and hair. The song of the male is very sweet, and consists of few notes, which have been jocularly set to the words, '*Little-bit-of-bread-and nō chē-ēse.*' He is remarkably attentive to his mate, and takes his turn in incubation. In many parts of Britain boys who would think it wrong to rob any other bird's nest esteem it a permissible kind of duty to rob that of the yellow-hammer. In Italy great numbers of yellow-hammers are caught, and fattened like ortolans for the table. It is a noteworthy circumstance that this bird is more rare in insular situations, in the islands of the Mediterranean, as well as the Orkneys. The name is a corruption of yellow-ammer; the Anglo-Saxon *amore* (cf. Ger. *ammer*). In Scotland the yellow-hammer is known as the Yoldrin or Yite.

Yellow Pigments. For artistic work in oil yellow ochre (see OCHRES), raw sienna (a native earth), cadmium yellow (cadmium sulphide), aureolin (a compound of cobalt and potassium nitrites), lemon yellow (barium chromate), and Naples yellow (basic lead antimoniate) are all permanent; but cadmium yellow and aureolin, which require to be carefully prepared, have a tendency to injure a few other colours when mixed with them. Gamboge (q.v.) and Indian yellow (prepared in India from cows' or camels' urine) are beautiful pigments, transparent or translucent, and much used in water-colour painting, but also to some extent as oil-colours. They have both, however, a decided tendency to fade. The other pigments named above are likewise used as water-colours, and are permanent, except Naples yellow, which is unsuited for water-colour painting. Cadmium and lemon yellows are opaque colours, or at least are so to a considerable extent. House-painters use yellow ochre and chrome yellow (chromate of lead) largely. The latter is of a more lively hue than the former, but it is not nearly so durable. Raw sienna is much used for graining painted wood to imitate oak. Yellow lakes, which include brown pink and Italian pink, are beautiful but fugitive colours. They are generally prepared from quercitron bark, but sometimes from Persian berries.

Yellow River. See HOANG-HO.

Yellow Sea, or WHANG-HAI, an important inlet of the Pacific Ocean, washes the north part of the east coast of China, and lies between the Chinese provinces of Shan-tung and Chiang-su on the one hand and Corea on the other; it terminates on the north-west in the Gulf of Pe-chi-li, and opens out in the south-east into the Tung-hai, or Eastern Sea. By degrees it is becoming shallower owing to the quantity of alluvium borne down into it by the rivers Hoang-ho (q.v.) and Yang-tsze (q.v.).

Yellowstone, the largest affluent of the Missouri River, rises high up in the Rocky Mountains in Wyoming, about 44° N. lat. and 109° 35′ W. long., flows 25 miles north-west to the mountain-girt Yellowstone Lake (22 miles long, 7788 feet above sea-level), thence northward through the National Park into Montana, partly through stupendous cañons, and then east-north-east and north-east to the Missouri, on the western border of North Dakota. It is some 1300 miles long, and is navigable for steamboats 300 miles, to the mouth of the Big Horn, its largest affluent.

The *Yellowstone National Park* occupies the extreme north-western corner of Wyoming, and forms a square about 75 miles in diameter. Its area was originally 3575 sq. m., to which congress in 1891 added a tract of nearly 2000 sq. m. to the south and east—nearly all more than 6000 feet

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mountains to 10,000 to 14,000 feet. Situated on the 'Great Divide,' 'its pine-clad mountains form the gathering-ground for the head-waters of large rivers flowing away to the Atlantic and Pacific oceans;' and for the sake of the rainfall and the rivers its forests are carefully preserved. The region is remarkable as well for its scenery as for its famous hot springs and geysers. The river has two falls about 15 miles below the lake, the lower one a magnificent cataract 330 feet in height; then it passes through the Grand Cañon (20 miles), and receives Tower Creek, which itself has leapt out of a deep and gloomy cañon known as Devil's Den over a beautiful fall of 156 feet. Near the river are many of the hot springs, those of White Mountain, near the northern boundary of the Park, extending for 1000 feet up the sloping side, and their snow-white calcareous deposits standing like a series of great frozen cascades. The semicircular basins, in which the water gathers in pools, and from one to another of which it flows over with gradually lessening temperature, are bright with bead-like tracery of scarlet, yellow, orange, and green on the white groundwork—the colours being nearly always due to the presence of certain coloured algæ that live in waters of high temperature, and by whose instrumentality the great siliceous and calcareous sinter deposits have been built up. A few miles from Sulphur Mountain, with its vapours rising from fissures and craters, is the active Mud Volcano, with a crater 25 feet in diameter. All the hot springs of the Park number nearly 10,000. But the most singular feature of the region is its geysers (see GEYSER, and illustration there), the most magnificent in the world. These are found principally on the Firehole River, a fork of the Madison, at the western end of Shoshone Lake, and in the Norris basin, to the north of that on the Firehole. The region was visited and described by surveyors in 1869, and explored and mapped in 1871. In 1872 congress dedicated and set it apart 'as a public park or pleasuring ground for the benefit and enjoyment of the people.' At the same time it provided against the wanton destruction of fish and game, or their capture or destruction for merchandise or profit; and, as a happy result of this enactment, several hundred bisons and some thousands of elk, antelopes, Rocky Mountain sheep, &c. have found a refuge within the park. Two troops of cavalry are quartered in the Park to preserve the forests and wild animals and to act as police. A branch of the Northern Pacific Railway extends to the northern boundary of the Park. See G. M. Synge, *A Ride through Wonderland* (Lond. 1892), and H. M. Cadell in the *Scot. Geog. Mag.* (May 1892).

Yellow Wood, a name given to Fustic (q.v.) and many other trees—e.g. satin-wood, and various kinds of podocarpus, rhus, xanthoxylum, &c.

Yemen. See ARABIA, SABÆANS.

Yenikale. See KERTCH.

Yenisei', one of the largest rivers of Siberia, formed by the junction of the Shishkit and Beikhem, which rise in the mountains on the southern border of Siberia. It flows north through the centre of Siberia into the Arctic Ocean, forming at its mouth a long estuary, and has a total course of about 3200 miles. It is navigable 1850 miles to Minusinsk. Its chief tributaries are the Angara or Upper Tunguska from Lake Baikal and the Lower Tunguska. For the navigation, &c. of the Yenisei, see SIBERIA, p. 427, and KARA SEA. See too Henry Seebohm's *Siberia in Asia: a Visit to the Valley of the Yenesay* (1882).

Yeniseisk, a town of Eastern Siberia, in the province of Yeniseisk, whose capital, however, is River, has a pop. of 8000, and a good deal of trade, depending largely on the gold and other mines of the district. The projected Siberian railway passes through Krasnoiarsk. For the (undeciphered) inscriptions found in this region, see *Les Inscriptions de l'Ienissei* (Helsingfors, 1889).

Yeoman (apparently from an assumed A.S. *gaman* or *geáman*, 'a villager;' from same root as Ger. *gau*, and *man*), a term which seems, in early English history, to have been applied to a common attendant menial servant, but after the 15th century came to denote a class of small freeholders, forming the next grade below gentlemen (see FRANKLIN). The term yeoman was also given to the forty shillings freeholder (see PARLIAMENT) or, more loosely, to any small farmer or countryman above the grade of labourer. The term is also familiar in the titles of functionaries in royal households, such as Yeoman Usher of the Black Rod, Yeoman of the Robes, &c.

YEOMEN OF THE GUARD, a veteran company, consisting of old soldiers of stately presence, employed on grand occasions in conjunction with the gentlemen-at-arms as the bodyguard of the sovereign. These yeomen were constituted a corps in 1485 by King Henry VII., and they still wear the costume of that period. Armed with partisans, and in their quaint uniform, the men present a singularly picturesque aspect. The officers of the corps are a captain (ordinarily a peer), a lieutenant, and an ensign—all old army officers. There are also a 'Clerk of the Cheque' and four 'Exons' (probably a form of the word *exempt*, 'an officer of police'), besides non-commissioned officers (messengers, sergeant-majors, yeomen bed goers, yeomen bed hangers), and 100 privates. The salary of privates is £50, besides army pension, of messengers £75; and the whole charge is borne by the sovereign's civil list. The Beef-eaters (q.v.) or warders of the Tower are, contrary to a common belief, an entirely different corps, but since the reign of Edward VI. have been privileged to wear the yeomen's uniform, without the shoulder-belt. See Preston's *Yeomen of the Guard* (2d ed. 1887).

Yeomanry, a volunteer force of cavalry in Great Britain numbering, in 1892, 14,095 of all ranks, and costing the country annually about £74,000. It was formed during the wars of the French Revolution, and then comprised infantry as well as cavalry; but all the infantry corps, and many of the cavalry, were disbanded after the peace of 1814. The organisation of the corps is by counties, under the lords-lieutenant. Troops are raised and drilled locally, and then assembled by regiments for training (eight days). The men provide their own horses and uniform, receive annually a clothing and contingent allowance of £2 a man, and draw during the annual training 2s. a day for forage, besides a subsistence allowance of 7s. a day. If called out for permanent duty, they receive cavalry pay, with forage allowance. Unlike the volunteers, yeomanry can be called out in aid of the civil power; and in time of invasion, or apprehended invasion, the sovereign may embody them for service in any part of Great Britain. When serving they are subject to military law under the provisions of the Army Act of 1881, and are then on the same footing as regular soldiers.

Yeovil, a town of Somerset, 40 miles S. of Bristol and 123 WSW. of London, is a busy, handsome place, built of red brick and yellow stone, and situated on a hillside sloping to the Yeo. St John's Church, 'the Lantern of the West,' is a fine Perpendicular structure of the 15th century, restored in 1864, with a tower 90 feet high. A Grecian town-hall was built in 1849. The woollen

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of kid and other gloves is largely carried on. Yeovil, which lost 117 houses by fire in 1449, is a borough by prescription, since 1853 under the Municipal Act. Pop. (1861) 7957; (1891) 9648.

Yesso. See YEZO.

Yetholm, a Border village of Roxburghshire, at the foot of the Cheviots, 7¼ miles SE. of Kelso. Bowmont Water divides it into Town-Yetholm and Kirk-Yetholm, the latter long the headquarters of the Scottish Gypsies, who seem to have settled here as early at least as the 17th century, and whose last 'queen,' Esther Faa Blythe (1797–1883), was visited here by Borrow and C. G. Leland. Pop. (1841) 944; (1891) 590. See works by Dr W. Baird (1862), Lucas (1882), and Brockie (1884).

Yew (*Taxus*), a genus of the natural order Taxaceæ (generally regarded as a sub-order of Coniferæ), characterised by solitary and terminal fertile flowers, with a solitary ovule sessile in the centre of a fleshy disc, forming a sort of drupe when in fruit. The genus Taxus is distinguished by a solitary terminal seed, surrounded by a succulent cup. The species are diffused over the whole northern parts of the world, and are large and beautiful evergreen trees, with narrow lanceolate or linear leaves. The Common Yew (*T. baccata*),

Branch of Yew (*Taxus baccata*).

a tree of 30 to 40 feet, and a trunk sometimes of great thickness, branching a few feet above the ground, and forming a large and dense head, is a native of the middle and south of Europe and of Siberia. Noble specimens of it are to be seen in many parts of Britain. It attains a great age, at least 300 or 400 years: for one in Darley Dale churchyard, Derbyshire, an age is claimed of 'as much as three thousand years,' this tree being 33 feet in girth; and an equal longevity is ascribed to the Fortingal Yew, near Aberfeldy, in Perthshire, which is now a mere wreck, but in Pennant's day (1772) girthed 56 feet. The wood has been much used from very early times for making bows, for which it is preferred to every other kind of wood. It is very hard, and reckoned almost equal to boxwood for fine work. Like the box, it occupies an important place in the old 'topiary' style of landscape gardening, being clipped into dragons, peacocks, and the like, and forming close, trim hedges. The heart-wood is of an orange-red or deep-brown colour. The fruit is red, and was long reputed poisonous, but the pulpy part is not so; the seed, however, is a dangerous poison. The leaves as a vermifuge. The Irish Yew (*T. fastigiata* of Lindley; *T. hibernica* of Hooker) is by many supposed to be a mere variety of the common species, with upright fastigiate habit, but it differs also in having the leaves scattered, whilst those of the common yew are in two rows. The North American Yew (*T. canadensis*) is of a humbler growth. The name Japan Yew is sometimes given to the nearly allied *Podocarpus macrophyllus*. Other species of Podocarpus are natives of the warmer parts of Asia, of Chili, Australia, &c. *P. nucifer* is a lofty tree of the northern provinces of Japan and mountains of Nepal, from the seed of which a culinary oil is extracted. To the order or sub-order Taxaceæ belong also the genus Salisburia (see GINGKO), the genus Dacrydium (q.v.), and Phyllocladis, a genus in which the foliage, as in Salisburia, has a remarkable resemblance to the fronds of ferns.

Yezd, or YAZD, a city near the centre of Persia, on a comparatively small oasis, beyond which is salt and sandy desert bounded by mountains. It is on the route between Ispahan and Kerman, has miscellaneous manufactures and a considerable trade in sugar, silks, opium, felt, copper, and arms. Pop. 40,000, of whom some 2000 or 3000 are Guebres or Parsees (q.v.) in faith, and are now said to be well treated both by the authorities and inhabitants.

Yezidis, a Kurdish people. See KURDISTAN.

Yezo, or Ezo, less correctly YESSO, the most northerly of the four great islands of Japan, is in size about equal to Ireland, and is still only partially settled. Its official name is *Hokkaido*, or 'Circuit of the Northern Sea,' received in 1870, when it was brought under a special colonisation department. An agricultural mission from the United States assisted in founding model-farms, laying out roads, and building bridges. The capital was changed from Matsumae to Sapporo, which was provided with a railroad to Otam, its port, and to Poronai, the great coal district inland. An agricultural college, breweries, canning factories, beet-root sugar factories, &c. were established, but with inconsiderable results. The coal-mines are worked by convict labour. A system of military settlements has of late years been put into force, partly with the view of furnishing a militia against possible invasion from Russia, which is supposed to covet the fine harbours of Yezo. The exposed port of Otam will probably be soon abandoned for the more sheltered harbour of Mororan, on Volcano Bay, now a naval harbour, to which a railway from Poronai mines has been built. The principal products of Yezo are coal, seaweed, sulphur, fish, the catches of salmon on the river Ishikari being sometimes enormous. The fauna and flora of Yezo differ materially from those of the main island, the bear being a different species resembling the grizzly. There are no monkeys; a species of grouse is found. The deer, once very plentiful, are now comparatively scarce. The Yezo pony, originally from Nambu on the main island, is hardy, and foreign blood has been introduced, promising good results. The original inhabitants of Yezo were probably pit-dwellers, of whom distinct traces have been found at Sapporo, Nemuro, and elsewhere. After these came Ainos (q.v.) or Ainus, whose principal settlement is at Piratori, 50 miles east of Mororan. The bear-festival, in September, is the great event of their year. The Ainos number 15,000, a population either stationary or decreasing; they are harmless, lazy, and drunken. The southern corner of the island was wrested from them in the 16th century, and the castle of Matsumae, in the extreme south-west, became in the next century the headquarters of Japanese rule. At the restoration in 1868 the

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supporters of the Tokugawa government made a last stand here, and were finally defeated at Hakodate. Yezo has a rigorous climate, being for six months of the year under snow and ice (2 feet in the south to 8 feet in the north). The centre of the island is but little known, although it has been crossed twice or thrice by Japanese and European explorers; the Ainos live mostly near the mouths of the rivers. The interior is mountainous and inhospitable; there are several active volcanoes.

See books quoted at AINOS; also Blackiston's *Japan in Yesso* (1882); Chamberlain's *Memoirs on the Ainos* (1888); Batchelor's *The Ainu* (1892).

Yggdrasil. See SCANDINAVIAN MYTHOLOGY. According to Vigfusson and Powell (*Corpus Poeticum Boreale*, 1883), Yggdrasil is not a primitive Scandinavian idea, but originating after the contact with Christianity, and so a corruption of the cross.

Yiddish. See HEBREW, SLANG (p. 496).

Yilgarn. See WESTERN AUSTRALIA.

Yoga, a system of Hindu philosophy (see SANSKRIT, Vol. IX. p. 153). *Yogin* is a follower of that system, but in popular acceptation a term generally denoting a Hindu ascetic or devotee.

Yokohama (pop. 130,000) is the chief port of entry in Japan, and the headquarters of foreign shipping companies, banks, consulates, and commerce generally. Until the opening of the country in 1854 it was an insignificant fishing-village, contiguous to the important town of Kanagawa, originally granted as a treaty settlement. The obstructions offered by the Japanese and the impatience of foreign merchants led to the practical abandonment of Kanagawa, which, however, still remained nominally the seat of the various consulates. Yokohama is a poorly laid-out town with narrow winding streets. The Bluff, however, conceded for residence in 1867, is a beautiful spot, commanding fine views of Fuji-san and of Yokohama Bay. The bay is very beautiful, and, though only an open roadstead, affords a good and commodious anchorage, not only to extensive mercantile shipping, but also to the naval squadrons of Great Britain, France, Germany, Russia, and other powers. Work on a large harbour was begun in 1889, the main object of which is to prevent the gradual silting up of the anchorage; it will be enclosed by two breakwaters 1¼ mile long, and an iron pier, 1900 feet long, will be connected with the railway to the capital, 17 miles off. Yokohama is a centre for tourists visiting Japan. The foreign community here is the largest in the country. After the Chinese, British residents, chiefly merchants and brokers, bulk most largely. There is a vigorous export trade in silk, tea, rice, and curios. The entire foreign trade of Yokohama aggregated £12,163,000 in 1890, and £13,087,000 in 1891—exports £8,257,000, and imports £4,830,000. Silk represents three-fifths of the exports, the rest being other tissues, tea, copper, &c.; the imports are cottons and woollens, raw sugar, oils, metals, chemicals, arms and ammunition, watches, &c.

Yonge, CHARLOTTE MARY, a popular novelist, and an author of considerable range and versatility, the only daughter of W. C. Yonge, of Otterbourne, Hants, was born in 1823. She gained a large constituency of readers by her *Heir of Redclyffe* (1853) and its successors, and her industry may be judged from the fact that within forty-four years (1848–92) she had published at least 112 volumes, or almost three annually, besides works translated and edited, and the editorship of the *Monthly Packet*. Her novels are natural, show dramatic skill and literary grace, and inculcate a healthy morality; many of them are made the vehicle of High Church opinions. A portion of the profits of the *Heir of Redclyffe* was devoted by the authoress to fitting out the missionary schooner *Southern Cross* for Bishop Selwyn. The profits of the *Daisy Chain*, amounting it is said to £2000, she devoted to the building of a missionary college at Auckland, New Zealand. In addition to fiction Miss Yonge has published several historical works, a work on *Christian Names* (1863), a *Life of Bishop Patteson* (1873), and a monograph on *Hannah More* (1888). An illustrated edition of her more popular novels and tales was issued (1888–89) in 35 volumes.

Yoni. See LINGA.

Yonkers, a city of New York, on the Hudson River, opposite the Palisades, and 15 miles by rail N. by E. of the Grand Central Depôt of New York. It manufactures silk, hats, machinery, mowers, elevators, &c., and, with its numerous villas, is rapidly becoming a suburb of the metropolis, whose northern boundary touches it. Pop. (1880) 18,892; (1890) 32,033.

Yonne, a department in the north-east of France surrounded by the departments of Seine-et-Marne, Aube, Côte-d'Or, Nièvre, and Loiret. Area, 2868 sq. m.; pop. (1886) 355,364; (1891) 344,688. The department is watered by the river Yonne, which flows across it in a north-east direction. The surface is hilly, many of the hills being covered with fruitful vineyards, the intervening valleys being beautiful and fertile. There are some fine forests in the department. The vineyards yield large quantities of wine, the best being those of Chablis, Auxerre, and Tonnerre. The chief mineral products are red granite, marble, limestone, and ochre; and there are some miscellaneous manufactures. Its arrondissements are Auxerre, Avallon, Joigny, Sens, Tonnerre; the capital is Auxerre.

York, the county town of Yorkshire, is situated at the confluence of the river Foss with the Ouse, 188 miles N. of London by rail. It is the seat of an archbishopric, the centre of the northern military district, and returns two members to parliament. The population of the municipal borough in 1881 was 61,789, and in 1891 (now a 'county borough') 66,984. The city, together with the surrounding district called the Ainsty, is under the jurisdiction of a lord mayor, twelve aldermen, and thirty-six councillors. York was known as Eboracum under the Romans, of whom many relics still remain, chief among them being the building known as the multangular tower. The numerous sepulchral monuments, pavements, and other relics now preserved in the museum were mainly found in the extensive Roman cemetery discovered in digging the foundations of the railway station. From the time of Henry II. for five hundred years parliaments occasionally sat at York, as the name of Parliament Street still bears witness, while under Henry III. the courts of King's Bench and Exchequer were held here.

The Minster is among the most magnificent of English cathedrals, and is of especial architectural interest owing to the fact of the fabric-rolls having been preserved, so that we know the precise dates at which the various portions were erected. Early in the 7th century Edwin, the first Christian king of Northumbria, founded, on the site of the present Minster, a church which perished by fire in 741. The church was rebuilt, but, during the conflagration of the city at the time of the Norman invasion, was again destroyed, with the exception of the central wall of the existing crypt, which also contains portions of the Norman church erected by Archbishop Roger (1154–81). Early in the following century the beautiful Early English transepts were added by Archbishop Gray. The present nave was built between 1291 and 1345; the graceful

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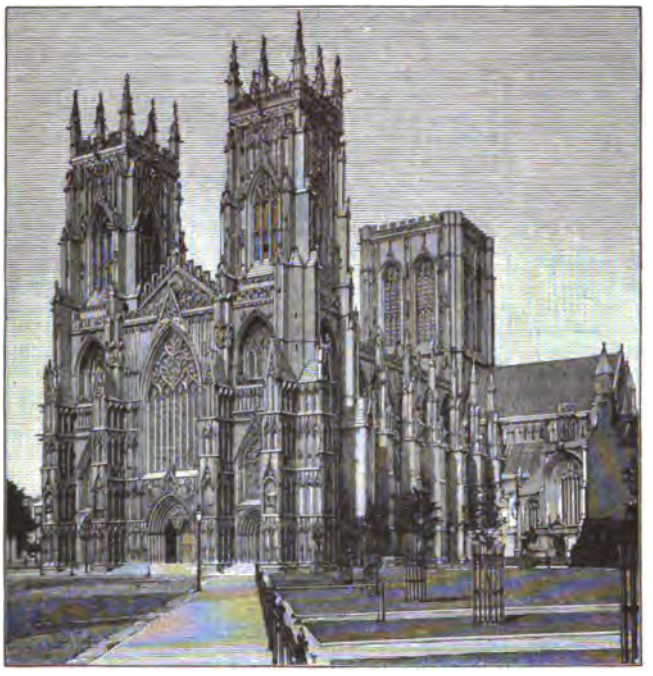
1330; and the Norman choir was replaced by a Perpendicular one, 1373–1400. The central lantern tower belongs to the beginning of the 15th century, and the two western towers were added between 1430 and 1470. In 1829 the roof and carved choir-stalls perished in an incendiary fire, and in 1840 another fire destroyed the roof of the nave and the splendid peal of bells, reducing the south-western tower to a mere shell. Especially worthy of notice is the Decorated stained glass, the great east window being almost unrivalled. The extreme



York Minster.

length of the Minster is 524 feet, of the transepts 250, and the breadth of the nave is 140 feet, the height of the central tower is 216, and of the western ones 201 feet.

The Benedictine Abbey of St Mary possessed great wealth and importance. It was founded in the reign of Rufus, but was largely rebuilt towards the end of the 13th century. In 1132 a small body of the monks, wishing to adopt the stricter Cistercian rule, seceded in spite of violent opposition, and finally founded the great Abbey of Fountains (q.v.). The existing ruins are principally those of the beautiful abbey church, while the old Guest-house has now been appropriated as a storehouse for Roman and other antiquities. At the Reformation York contained forty-one parish churches, of which twenty-two now remain, several new ones having been added. There is a fine Roman Catholic pro-cathedral (1864). The present walls, 2¾ miles in circuit, are mainly of the time of Edward III., though in many parts they follow the line of the Roman earthwork. They are pierced by picturesque gates, locally called Bars, of which Bootham Bar and Micklegate Bar are especially well preserved. The castle, with its picturesque Clifford's Tower, is situated close to the river, and is believed to date from the time of Edward I., though older portions may be included in the structure, which suffered severely during the siege of 1644. The Assize Courts are now held in a portion of the hall belongs to the 15th century.

There are several endowed schools: St Peter's School, under the government of the Chapter, founded in 1557; Archbishop Holgate's Free School, dating from the time of Henry VIII.; the Blue-coat School for boys, the Grey-coat for girls, and the Yorkshire School for the Blind. Among other institutions may be enumerated the County Hospital, the Dispensary, and the Lunatic Asylum. York is an important railway centre, and its station (1873–77) is one of the largest in England. The British Association was organised at York in 1831, and its jubilee meeting was appropriately held there in 1881. For other events in the history of the city, see YORKSHIRE.

York, the capital of York county, Pennsylvania, on Codorus Creek, 28 miles by rail SSE. of Harrisburg. It has a large granite court-house, a handsome collegiate institute, numerous churches, and several foundries, car-factories, railway-shops, planing-mills, and manufactories of shoes, condensed milk, &c. York, which is a pleasant town, dates from 1741, and was the seat of the Continental congress for a time in 1777. Pop. (1880) 13,940; (1890) 20,793.

York, a river of Virginia, formed by the union of the Pamunkey and Mattapony, flowing south-east to Chesapeake Bay, nearly opposite Cape Charles. It is 40 miles long, and from 1 to 3 miles wide.

York, THE DUKEDOM OF, has been frequently conferred by the king of England on his second son. Edward III. bestowed it on his fourth son Edmund, who founded that House of York which formed the one side during the Wars of the Roses (see ROSES, WARWICK, and Sir J. Ramsay's *Lancaster and York*, 1892), and which in the persons of Edward IV., Edward V., and Richard III. occupied the throne of England. Henry VIII. and Charles I. were dukes of York while their elder brothers were alive; James II. till his accession. The Old Pretender conferred the dignity on his son, afterwards Cardinal York (see STEWART, p. 726). George I. honoured with this title his brother Ernest Augustus, prince-bishop of the secularised see of Osnabrück (d. 1728); and in 1760 the rank fell to Edward Augustus (1739–67), George III.'s brother. George III. gave it to his second son, Frederick Augustus, prince-bishop of Osnabrück (1763–1827), who showed his military incapacity in command of an expedition to the Netherlands against the French in 1793, and again in 1799, having in 1795 been made commander-in-chief of the British army. He had to resign that post because of the shameful traffic in military appointments carried on by his mistress, Mrs Clarke, but was reinstated (1811). The title was next in abeyance till May 1892, when the dukedom was conferred on Prince George Frederick Ernest Albert, second son of the Prince of Wales, who by the death of his elder brother the Duke of Clarence and Avondale in January of the same year had become heir to the crown of England. Born at Marlborough House on 3d June 1865, Prince George was trained as a naval officer; and his brother's and his own diaries of their cruise on

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H.M.S. *Bacchante* (1879–82) were published in 1885. He was appointed to the command of the *Thrush* in 1890, and in 1891 became a commander.

York, CARDINAL. See STEWART, p. 726.

Yorke, PHILIP, EARL OF HARDWICKE (1690–1764), rose through all the legal dignities till in 1737 he became Lord Chancellor. He supported Walpole, and held office under the Duke of Newcastle. His name is associated with the Marriage Act of 1754 which put an end to Fleet marriages (see FLEET PRISON).

Yorkshire is by far the largest of the English counties. It is bounded on the E. by the sea, separated on the N. by the river Tees from the county palatine of Durham, divided mainly from Westmorland and Lancashire by the water-parting of the Pennine chain on the W., and bounded on the S. by Derbyshire and Notts, while the Humber separates it from Lincolnshire. The western boundaries of the county were not fixed till the erection of the Earldom of Lancaster in the reign of Henry III., in Domesday Book the northern part of Lancashire and portions of Westmorland and Cumberland being included in the West Riding. For administrative purposes Yorkshire is divided into three Ridings (*thridings*, or 'thirds'), each of which has its own lord-lieutenant, magistracy, and constabulary. There are eleven wapentakes in the North Riding, nine in the West Riding, and six in the East Riding. The wapentake of the Ainsty, or county of the city of York, is a 'peculiar,' under a jurisdiction of its own, that of the lord mayor and aldermen of York; but it is included in each of the three Ridings for certain specific purposes. Sundry subdivisions of the county go by the name of shires, as Hallamshire, Richmondshire, Allertonshire, Howdenshire, Cravenshire or Craven, Holderness, and Cleveland. The county contains three cities, York, Ripon, and Wakefield, 19 municipal boroughs, 59 market-towns, and 1639 parishes and townships separately rated for the poor. The total area is 3,882,851 statute acres, or nearly 6067 sq. m., all, with the exception of the catchment basins of the Esk and parts of those of the Tees and Ribble, being drained by the Ouse and its great tributaries, the Swale, the Ure, the Nidd, the Wharfe, the Aire, the Don, and the Derwent. Since 1885 the county divisions have returned twenty-six members, and the cities and boroughs the same number. Pop. (1801) 859,133; (1841) 1,592,059; (1881) 2,886,564; (1891) 3,208,813, of whom 399,412 were in the East Riding, 368,237 in the North, and 2,441,164 in the West Riding.

In Yorkshire the older rocks lie mainly to the north-west, and the newer to the south-east. On the extreme western border of the county are found the most ancient strata—viz. the slates and flags of Hougill Fells and Ingleton. These are overlaid by the mountain-limestone and the millstone grits of the Pennine chain, which are intersected by the magnificent dislocation of the great 'Craven fault,' to which is due some of the most striking scenery in Yorkshire. The lift varies between 300 and 3000 feet, causing the precipitous cliffs of Gordale, Malham, Settle, and Ingleborough, which are honeycombed by extensive caves. The Pennine chain rises to its highest point in Mickle Fell, 2581 feet, while Ingleborough and Whernside touch respectively 2361 and 2384 feet. On the eastern side of the chain are the famous 'Yorkshire dales,' Wensleydale, Wharfedale, Swaledale, and others, in many of which are picturesque waterfalls, or forces, as they are locally called—such as Caldron Snout and High Force in Teesdale, or Aysgarth Force and Hardraw Force on the Ure, where the rapid mountain-streams leap over ledges formed by the harder strata of the mountain-limestone. The Yorkshire coal-measures, on which are situated the manufacturing towns of Leeds, Bradford, Sheffield, Rotherham, Huddersfield, and Halifax, are confined to the southern portion of the county, and are continuous with the coalfields of Derbyshire and Notts. In the North Riding we have a great development of the Lias, in which are imbedded the ammonites well known to visitors at Whitby; while the Cleveland moors, which rise to heights of 1400 feet, are dissected by a great trap dyke running from west to east, which is extensively quarried at various points for road-metal. The prosperity of Middlesborough is due to the celebrated hematite iron ores of Cleveland, which have been extensively worked of late years. In the East Riding the Oolitic beds are overlaid by the Kimmeridge Clay and by the Chalk, which forms the high tableland of the Wolds, while the greater part of Holderness is covered by a thick superficial stratum of glacial drift and alluvium. The rich level tract of the Vale of York also consists of glacial and alluvial deposits, thickly overlying and concealing the New Red Sandstone.

The sepulchral barrows on the Wolds, and the caves of Craven and Kirkdale have yielded results of the highest importance, forming the basis of our knowledge of the prehistoric animals and races of Yorkshire. At the time of the Roman conquest the country was inhabited by the Celtic tribe of the Brigantes, or 'hillmen,' whose capital was at Boroughbridge (*Isurium*), where gigantic monoliths still bear witness to their rule. The country was invaded by the Romans about 50 A.D., more than a century after Cæsar's landing in Kent, the conquest being completed in the reign of Vespasian, by Agricola, *c.* 79 A.D. York (*Eboracum*) is first mentioned as being the headquarters of the Sixth Legion, which came into Britain with Hadrian, and for 300 years remained stationed at York, which became the chief city of Northern Britain, the surrounding country being studded with camps and covered with a network of Roman roads. Several of the emperors visited York, and here in 211 died Severus, and in 306 Constantius Chlorus. And from York his son Constantine the Great, having been proclaimed by the soldiery, set forth to assume the purple. In 410, in consequence of the Vandal invasion of Gaul, the legions were withdrawn by Honorius, and for 150 years utter darkness closes in, and envelops the overthrow of the Brito-Roman civilisation, and the establishment of the Teutonic kingdoms. The earthen ramparts, thrown up to hinder the march of the invaders, may still be traced. In 500 A.D. St Samson of Dol, we are told, was driven from his bishopric of York, and in the middle of the 6th century (547) we find that the heathen Angles had established their rule, although the little British kingdoms of Leeds (*Loidis*) and Elmet held out till 616, when they were conquered by King Edwin of Northumbria, the Yorkshire portion of whose realm was known as Deira. Edwin, who had been baptised by Paulinus on Easter Day, 627, was defeated and slain at Hatfield Chase near Doncaster in 633, by Penda, the heathen king of Mercia. Toward the end of the 8th century the Northmen began to appear in the Humber, ravaging and finally settling in the country; while York became the capital of a Danish kingdom.

In 1066, three weeks before the battle of Hastings, Harold and Earl Morkere issued from York to vanquish the Norwegian army at Stamford Bridge. It was not until 1068 that William marched into Northumbria, and on the suppression of the final struggle for independence in the following year a broad belt of country underwent that ruthless devastation of which we find notable

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traces in Domesday Book. Henceforth Yorkshire is known by its modern name.

At the battle of the Standard, fought near Northallerton, David, king of Scotland, was repulsed in 1138 by the northern barons. During the Wars of the Roses, Richard, Duke of York, was defeated by Queen Margaret and slain at the battle of Wakefield, in 1460; and in the next year Edward IV. won the bloody victory of Towton over Henry VI. The year 1536 is signalised by the rebellion in defence of the old faith, known as the Pilgrimage of Grace; York, Pontefract, and Hull being captured by the insurgents. In 1569 Yorkshire was the scene of another rising on behalf of Mary Queen of Scots. During the Civil War the county was mainly royalist. Bradford, Hull, Pontefract, and Scarborough were besieged, and the attempt of the royalists to raise the siege of York was frustrated by their crushing defeat at Marston Moor (July 2, 1644).

No part of England is richer in the remains of monastic houses, of which there were at the dissolution fifty-three abbeys and priories and twenty-eight friaries. The beautiful buildings of Rievaulx, Jervaulx, Fountains, Kirkstall, and Bylands are unequalled among the Cistercian houses not only of England, but of Europe. The three great Benedictine houses were Whitby, Selby, and St Mary's, York, the two latter being ruled over by mitred abbots. The magnificent pile which goes by the name of Beverley Minster was the church of a college of secular canons, as also were York Minster and Ripon Cathedral. Newburgh, Nostel, Bridlington, Guisborough, Bolton, and Kirkham were all Augustinian priories. The Priory of Mount Grace was Carthusian, Easby Abbey was Premonstratensian, and Malton Priory Gilbertine. Lastingham, where there is an ancient Saxon crypt, possesses great interest as being the seat of the early Irish Christianity introduced into Yorkshire by St Chad; while in the ancient crosses and inscriptions at Kirkdale church we have some of the oldest ecclesiastical remains in England.

Among the Yorkshire castles may be named those of Knaresborough and Pontefract, the old and interesting ruin of Conisborough, Richmond, with its fine Norman keep, Middleham, the residence of Warwick the king-maker, and Bolton, the prison of Mary Queen of Scots. Wressle Castle was once the seat of the Percies, and Gilling, which is still used as a residence, of the Fairfaxes.

Since the beginning of the 19th century the manufactures of Yorkshire have enormously developed. Leeds and Bradford are the centres of the woollen and worsted trades, while the cutlery of Sheffield is unrivalled. Of the numerous smelting and puddling furnaces the chief are those at Rotherham and Middlesborough. The agricultural portions of the county are well served by railways, while the manufacturing districts are covered with a network of lines; the chief towns being also connected by a system of canals, extending from sea to sea, and piercing the Pennine chain, at a height of 656 feet above the sea, by a tunnel three miles in length. Beyond the mining and manufacturing districts the population is agricultural, one of the principal industries being horse-breeding, for which Yorkshire is famous. Among the inland health-resorts Harrogate and Ilkley rank first, while the coast southward from Redcar and Saltburn is fringed with small watering-places, in addition to the larger towns of Whitby, Scarborough, Filey, Bridlington, Withernsea, and Hornsea.

Allen's *History of Yorkshire* and Baines's *Yorkshire Past and Present* are the only general histories, but are inadequate in scale and execution. Certain districts have been well treated, Poulson's *Holderness* and Hunter's *Hallamshire and South Yorkshire* deserving special commendation; Drake's *Eboracum*, Ormsby's *Diocesan History*, Lawton's *Collections*, Dixon's *Fasti Eboracences*, and Phillip's *Geology of Yorkshire* may be consulted, together with many less important works enumerated in Anderson's *English Topography*. See DIALECT; Rev. C. F. Morris, *Yorkshire Folk-talk* (1892), &c.

Yorkshire College. See LEEDS.

Yorktown, capital of York county, Virginia, on the York River, 10 miles from its mouth. Pop. 250. Here Lord Cornwallis surrendered to Washington in 1781; and here the Confederates, who had fortified the place, were besieged in 1862 by McClellan, and compelled to evacuate it.

York von Wartenburg, HANS DAVID LUDWIG (1759–1830), Prussian field-marshal and count, was the son of a Pomeranian, Captain von York (or Jarck), descended, according to the family tradition, from an English family that had settled during the Stewart troubles first in Sweden and then in Pomerania. Young York entered the army in 1772, was cashiered for insubordination, and served the Dutch in the East Indies, but returning to the Prussian service gained glory in the wars of 1794, 1806, and 1812. He was especially distinguished during the war of liberation and the invasion of France (1813–14). Ennobled in 1814, he was made a field-marshal in 1821.

Yoruba, or YARRIBA, a country of Guinea, West Africa, lying to the north-east of Dahomey, and between the British colony of Lagos and the Niger Company's territories. Its area is not perfectly definite; the population, some 2,000,000, are Soudanese Negroes, partly Mohammedanised.

Yosem'ité Valley is a cleft in the west slope of the Sierra Nevada, about the centre of California, and 140 miles E. of San Francisco. The name Yosemite is an Indian word which signifies 'large grizzly bear.' This celebrated valley, noted for the sublimity and beauty of its scenery, is about 6 miles long and from ½ to nearly 2 miles in breadth, and is traversed by the Merced River. The visitor is awed and impressed by the massiveness of its mountain elevations, the nearly perpendicular granite walls, from 3000 to 6000 feet high, by which it is shut in throughout its entire length, and the grandeur of its waterfalls, which are in some respects the most remarkable in the world. At the lower end of the valley stands the striking cliff known as El Capitan, 3300 feet high, while from near its lower corner the Virgin's Tears Fall descends 1000 feet. But the eye turns from it to the remarkable fall opposite, happily named the Bridal Veil, which leaps from the brow of a cliff 900 feet high, and descends in a broad sheet of spray and finally mist, swaying in the wind and constantly changing its form of fleecy beauty. Farther up the valley are Cathedral Rock (2660 feet), the Three Brothers (3830), Sentinel Rock (3043), and directly opposite it the grand Yosemite Falls; here the stream, 25 feet wide at the crest, takes a first leap of 1500 feet, then rushes 626 feet down in a series of cascades, and finally plunges 400 feet to the bottom. Above the falls are the North Dome (3568) and the vast Half Dome, nearly a mile (4737) high, whose summit can now be reached by a long climb. Two miles above the great falls the stream enters the main valley in two arms, coming out of two cañons. In that of the south fork is the Illilouet Fall, some 600 feet high; in the main cañon are Vernal Fall (400) and Nevada Fall (600), the latter one of the finest in the world. It is only, however, during the season of rains and melting snows that the valley can be seen at its best; in August and September the Virgin's Tears Fall disappears, the Bridal Veil shrinks almost to nothing, and even the Yosemite is reduced to comparative insignifi-

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their fastness here; its fame quickly spread, and congress wisely took steps to preserve its beauties, and in 1864 handed it over to the state, along with the Mariposa grove of big trees (see SEQUOIA), to be held as inalienable for all time 'for public use, resort, and recreation.' There are several hotels, a post-office, and a chapel in the valley, besides the houses of the guardian and the guides and others under him. A commission appointed by congress to investigate its management, however, at the end of 1891 reported that much of the timber had been destroyed for buildings, fences, and fuel, or removed to clear the land for cultivation; that more than half the valley had been fenced with barbed wire and cultivated in grass and grain, leaving scarcely paths for pedestrians, while in other parts stock was pastured; and in effect the place was being turned into a farm and stock ranch. The secretary of the interior reported the matter promptly to congress, with a view to putting an end to this at once.

Youghal (pron. nearly *Yawl*), a seaport of County Cork, on the estuary of the Blackwater, 27 miles E. of Cork by rail. The town has some structures of interest—the parish church, which is formed of the nave and aisles of the ancient collegiate church, built by the Earl of Desmond in 1464; the 'water-gate' and the 'clock-gate;' and Sir Walter Raleigh's house, Myrtle Grove, which remains nearly in its original state. There is a handsome Roman Catholic church, and remains of several ancient conventual and other buildings. Parts of the old walls are standing. The trade of Youghal lies chiefly in the export of agricultural produce; the harbour is obstructed by a bar. According to local tradition, the potato was first planted at Youghal by Raleigh, who was mayor in 1588. The town sent a member to parliament till 1885. Pop. (1851) 7410; (1891) 4317.

Young, ARTHUR, writer on agriculture, was born on 11th September 1741 at Whitehall, but passed his boyhood, as indeed most of his life, at Bradfield Hall, near Bury St Edmunds, his father, Dr Young, being rector of Bradfield Combust and a prebendary of Canterbury. On quitting Lavenham grammar-school he was apprenticed in 1758 to a mercantile house at Lynn; but this 'most detestable situation' he left next year, upon his father's death, 'without education, pursuit, profession, or employment.' In 1763 he rented a small farm of his mother's, on which he made 3000 unsuccessful experiments; in 1765 married, not too happily, a sister of Fanny Burney's stepmother; during 1766–71 held a good-sized farm in Essex (ruin the result); from 1776 to 1778 was in Ireland; resumed farming at Bradfield; and in 1793 was appointed secretary to the newly-established Board of Agriculture, with a salary of £600. Blind from 1811, he died in London on 20th April 1820, and was buried at Bradfield. Arthur Young, by his writings, was one of the first to elevate agriculture to the dignity of a science, and render it popular among the upper classes of the country. Those writings, more than a score in number, include *A Six Weeks' Tour through the Southern Counties* (1768), *A Six Months' Tour through the North of England* (4 vols. 1771), *The Farmer's Tour through the East of England* (4 vols. 1770–71), *Tour in Ireland* (1780), *Travels in France during 1787–88–89–90* (2 vols. 1792–94), *The Farmer's Kalendar* (1800; 215th ed. 1862), and 'Agricultural Surveys' of eight English counties, besides many papers in *The Annals of Agriculture*, which he edited, and to which George III. ('Farmer George') was a contributor. His works were as successful as his practice was unsuccessful, and

See the Life by M. Betham-Edwards, prefixed to her edition of the *Travels in France* (1890), and A. W. Hutton's edition of the *Tour in Ireland*, with a bibliography by J. P. Anderson (2 vols. 1892).

Young, BRIGHAM, American Mormon leader, was born at Whitingham, Vermont, June 1, 1801, and was the son of a small farmer proprietor. He received eleven days' schooling, and then was successively employed as carpenter, painter, and glazier in Mendon, New York. He first saw the 'Book of Mormon' in 1830, and in 1832, having become converted by Samuel H. Smith, a brother of the 'prophet,' he was baptised and began to preach near Mendon. Next he went to Kirtland, Ohio, was made an elder, and preached in Canada, 1832–33. In 1835 he was appointed one of the twelve apostles of the Church, in 1844 president; and the Mormons, when driven from Nauvoo, were after various wanderings led by him to Utah in 1847. In 1840 he had visited England, and as a result there were 2000 proselytes that year. In 1848 the great body of Mormons arrived at Utah, and founded Salt Lake City; and in 1851 Mr Fillmore, president of the United States, appointed Brigham Young governor (1851–58). In 1858 a new governor, Cumming, was appointed, and sent with a force of 2500 United States troops to protect him and the Federal officers; a compromise was effected, and the troops remained until 1860. The determination of the United States to abolish polygamy, and the appointment, in 1869, of a new United States governor, contributed somewhat to reduce Young's authority. In 1874 his fifteenth wife petitioned the United States courts for a divorce, and separated from him. Young encouraged agriculture and manufactures, made roads and bridges, carried through a contract for 100 miles of the Union Pacific Railroad, and was otherwise a friend to commercial progress. Practical and far-seeing, he had the faculty of accumulating wealth, although on one side of his character he appeared to be a fanatical enthusiast. Young died August 29, 1877, leaving a fortune of 2,600,000 dollars to seventeen wives and fifty-six children. See MORMONS, SALT LAKE CITY, and UTAH.

Young, CHARLES MAYNE, tragedian, was born on 10th January 1777, the second son of a clever but scoundrelly London surgeon. He spent a twelvemonth with an uncle at the Danish court (1786–87), was educated at Eton and Merchant Taylors, and, driven from home with his mother and two brothers, had for a while been a clerk in a West India house, when in 1798 he made his début at Liverpool. One hiss—his father's—was mingled with the applause that greeted his first appearance in London, in 1807, as 'Hamlet;' this, 'Iago,' and 'Falstaff' being perhaps his best characters. 'With his personal advantages and his d—d musical voice,' as Kean put it, he was a really original actor, second only, nay in some parts superior, to Kean himself. In 1829 he declined an offer of £12,000 for a ten months' tour in the United States, and in 1832 he retired with a fortune of £60,000. He died at Southwick, near Brighton, on 28th June 1856. In 1805 he had married a brilliant young actress, Julia Anne Grimani (1785–1806), who left him a son, the Rev. Julian Charles Young (1806–73). He was educated at Clapham, St Andrews, and Worcester College, Oxford; became rector of Southwick, Sussex (1844–50), and then of Ilmington, Worcestershire; and published a most amusing *Memoir of Charles Mayne Young* (2 vols. 1871), four-fifths of which is taken up with his own Journal, and which was supplemented in 1875 by *Last Leaves* from that same Journal.

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Young, EDWARD, author of the *Night Thoughts*, was born at Upham rectory, Hampshire, in June 1681. Later his father rose to be dean of Salisbury and chaplain to William and Mary. He was educated at Winchester, entered New College, Oxford, in 1703, but after a few months migrated to Corpus Christi College, and in 1708 received a law fellowship in All Souls College from Archbishop Tenison. Here he seems not to have been righteous overmuch, to have passed, in Pope's words, 'a foolish youth, the sport of peers and poets.' Yet we are told he used to stand up to Tindal and more than hold his own in the struggle. He came before the world as a poet in 1712 with an *Epistle* to George Granville on being created Lord Lansdowne —a characteristic beginning for Young, who continued through life one of the most persevering and shameless toadies that ever flattered a patron or a king's mistress. His *Last Day* and *Force of Religion, or Vanquished Love*, followed in 1713; the poem on the *Death of Queen Anne*, written with one eye on her successor, the year after. In 1719 he ventured on the more ambitious effort of a tragedy, which, under the title of *Busiris*, was brought out at Drury Lane. Its inflated style was made fun of most happily by Fielding in his mock tragedy of *Tom Thumb*. About the end of 1716 Young seems to have been in Ireland in attendance on the hare-brained and dissolute young Marquis of Wharton (made duke in 1718). For some time also he resided in the family of the Marquis of Exeter as private tutor to Lord Burghley. But about 1719 we find him again in the train of Wharton, who gave him in 1721 a bond for £600 in consideration of his expenses in travelling and his losses in unsuccessfully contesting Cirencester. The duke seems to have entertained for him a real kindness, but the pious author of the *Night Thoughts* must have bowed low and often in the House of Rimmon to have retained it, as well as to have been a friend of that wretched reprobate Bubb Dodington, at whose seat at Eastbury in Dorsetshire he saw much of Voltaire in 1722. At Wharton's death in 1731 Young set forth certain claims against his estates, which he succeeded in making good to the extent of an annuity of £200. In 1721 was produced his tragedy *The Revenge*, which, though unsuccessful at the time, is still occasionally acted. The dedication to Wharton is a disgusting piece of flattery, which he could not but have known to be a lie. His third and last attempt in this field, *The Brothers*, was produced in 1753. Between 1725 and 1728 appeared in succession his satires, under the title of *The Love of Fame, the Universal Passion*. These had a great success, and brought to their fortunate author money as well as fame. Spence says Wharton alone gave him £2000. These satires show wit and talent, and even yet will repay perusal. For *The Instalment* (1726), a poem addressed to Sir Robert Walpole on his being made a Knight of the Garter, he was rewarded with a pension of £200. In 1727 Young took holy orders, and was appointed one of the royal chaplains; and in 1730 he became, by favour of his college, rector of Welwyn in Hertfordshire, a living worth £300 a year. The year after he married Lady Elizabeth Lee, the daughter of the Earl of Lichfield, and widow of Colonel Lee. He may be taken to have been happy with her, for out of his grief at her death (1741), together with that of her daughter and her daughter's husband, grew the *Night Thoughts* (1742–44), which, in spite of much fustian sublimity and artificial melancholy, bear the stamp of genuineness. He never received any further preferment in spite of his frequent complaints of being neglected, and he had not the honour to be the original of Parson Adams. His only son, a sensible young man, disliked the influence of his father's housekeeper, and for some years saw little of him. Young superintended in 1762 a collected edition of his works in 4 vols., from which he excluded certain of the most fulsome of his dedications. He died April 12, 1765.

Young's *Night Thoughts* has never since ceased to be popular, and many of its sententious lines have passed into common and almost proverbial use. Many passages show point and force, soaring sometimes into the region of real poetry; many more, however, degenerate into flat verbiage, or sink into profound and hopeless bathos. His besetting mannerism is antithesis and grandiloquence, a pair which hang but indifferently together. But indeed fatal faults throughout all his work are the lack of genuine human sympathy, and a constant and radical insincerity as a poetic artist.

See the edition, with a poor Life, by Dr Doran (2 vols. 1854). The best life is that in Johnson's *Lives of the Poets*, written by Herbert Croft, junior, in October 1782, and inserted by Johnson in his work. For a severe but justifiable enough attack on Young's character, see 'Worldliness and Other-Worldliness,' by George Eliot, in the *Westminster Review* for 1857, reprinted in her *Essays and Leaves from a Notebook* (1884).

Young, JAMES, of paraffin fame, was born in Glasgow, July 14, 1811. The son of a joiner and cabinet-maker, he learned his father's trade, but attended classes, especially in chemistry, at the Andersonian College and the Mechanics' Institution in the evening. He became assistant in Glasgow to Professor Graham in 1832, and in 1837 obtained a post in University College, London. As manager of chemical works near Liverpool (1839) and near Manchester (1843) he discovered cheaper methods of producing stannate of soda and chlorate of potash; and it was his experiments made between 1847 and 1850 which led to the manufacture of paraffin-oil and solid paraffin on a large scale (see PARAFFIN). A friend of Dr Livingstone, he sent out an expedition to Africa to find him. He endowed a chair of Technical Chemistry in the Andersonian College, and was made LL.D. by Glasgow University. He died May 13, 1883.

Young, ROBERT, LL.D., biblical scholar, born at Edinburgh, September 10, 1822, was bred a printer, superintended the Mission Press at Surat (1856–61), thereafter devoted himself to the preparation, the printing and publishing at Edinburgh, of a long series of meritorious books of somewhat narrow but remarkable biblical scholarship, working with unbroken industry down till his death, October 14, 1889. Among his books were an independent Translation of the Bible, *Marginal Readings* (10,000) *for the English Testament*, *Concise Critical Comments on the Holy Bible*, *Grammatical Analysis* of the Hebrew, Chaldee, and Greek Scriptures, *Hebrew Vocabulary*, and the laborious *Analytical Concordance to the Bible*, giving 311,000 references, &c.

Young, THOMAS, physicist, was born of Quaker parents at Milverton, Somersetshire, June 13, 1773, studied medicine at London, Edinburgh, Göttingen, and Cambridge, and started as doctor in London in 1800, but soon devoted himself to scientific research, and in 1801 became professor of Natural Philosophy to the Royal Institution. His *Course of Lectures* (1807) expounded the doctrine of Interference (q.v.), which established the undulatory theory of Light (q.v.). He was secretary to the Royal Society and to the Board of Longitudes, and did valuable work in insurance, hæmodynamics, and Egyptology (see HIEROGLYPHICS). He died May 10, 1829. See his Life by Peacock (1855).

Young England, the name applied, during the Corn-law struggle (1842–45), to a little band of young Tory politicians who wished to revive the

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Manners (afterwards Duke of Rutland, 1815–88), Mr Cochrane Baillie (Lord Lamington, 1816–90), the Hon. G. Smythe (Viscount Strangford, 1814–57), and Mr Disraeli (Earl of Beaconsfield, 1804–81), whose novels *Coningsby* and *Sybil* (1844–45) are an exposition of their principles.—'YOUNG IRELAND' was the name given to the Revolutionary party in Ireland in 1848, comprising W. Smith O'Brien (q.v.) and Gavan Duffy (q.v.; and see also O'CONNELL). The 'forward' though not necessarily revolutionary spirits in various countries are known in the same way as 'Young Italy,' 'Young Japan,' &c.

Young Men's Christian Associations were originally founded mainly for the spiritual and mental improvement of young men by means of devotional meetings, Bible classes, lectures, and libraries. It is on record that some London apprentices met, in 1632, at 5 A.M. on Sunday mornings for prayer and religious conversation. In 1678 a band of young men in connection with the Church of England met to 'apply themselves to good discourse and things whereby they might edify one another,' and did practical work amongst the poor, and amongst young men. There were thirty-two such societies in 1698. The societies for the Reformation of Manners were recruited mainly from these associations; and Methodism sprang from an association of godly young men at Oxford (1729). There were other young men's societies for missionary and other work previous to the founding of the London Y.M.C.A. in 1844, mainly through the exertions of Mr George Williams, of Hitchcock, Williams, & Co., of St Paul's Churchyard. Twelve young men met on 6th June 1844, in a room in St Paul's Churchyard, founded the 'Young Men's Christian Association' as a 'society for improving the spiritual condition of young men engaged in the drapery and other trades. In 1845 a course of lectures was begun, which, when published as 'Exeter Hall Lectures,' filled 20 volumes (1845–65). The movement took firm root in London and in the provinces. At the general conference of delegates from the associations of Europe and America, held in Paris in August 1855, a basis of alliance was agreed upon; and later conferences at Geneva (1858), in London (1862 and 1868), further aided the movement. Suitable buildings were secured in Aldersgate Street in 1855; and Exeter Hall was acquired in 1881 at a cost of £25,000, an additional sum of £30,000 being raised to adapt the building for use. Amongst the agencies in connection with this centre are fine gymnasiums; 109 classes, giving choice of a wide range of subjects, reading-room, conversation room, library, Bible classes, devotional meetings, tea and dining rooms; seaside homes, baths, employment and apartment register, &c. In 1892 there were 846 centres of work in the United Kingdom, with 83,817 members and associates, of which 504 were in England and Wales, 264 in Scotland, and 78 in Ireland. At the same date there were 3361 in Europe, 124 in Asia, 28 in Africa, 1440 in America, and 29 in Oceania, the total membership for the world being 418,972. Of this number there were 19 centres in Australia, 6 in New Zealand, 83 in Canada, 44 in India, 21 in Ceylon, and 24 in Cape Colony. In many of our home churches the Young Men's Christian Association is a branch of the Guild of Christian Workers, and is called a Young Men's Guild. Since 1851, when associations were formed in Montreal, New York, Boston, and Philadelphia, the movement has taken firm root in America, and there are splendid buildings in Brooklyn, New York, Philadelphia, and elsewhere, which, with their gymnasiums, libraries, reading-rooms, devotional meetings, and summer schools, are busy centres of Christian the service of a young men's Christian association. The Christian Endeavour Associations, formed at Portland in 1881, had a membership of upwards of one and a half millions of young people in 1892, scattered over America, with branches in England, Australia, and Japan. This movement is entirely undenominational.

The YOUNG WOMEN'S CHRISTIAN ASSOCIATION, founded in 1857, has kindred aims in seeking the spiritual good, and the moral, social, and intellectual well-being of young women. In London alone there were, in 1892, 47 institutes, homes, and restaurants, over 100 smaller branches, and 17,000 members. The total membership was computed at 100,000—Scotland having 18,000. The work includes evening classes, gymnasiums, reading-rooms, holiday homes, circulating libraries, provident and emigration and total abstinence departments, as well as a Factory Helpers' Union, and Travellers' Aid Society for meeting girls at the London railway stations or at the docks. Several periodicals are issued in the interests of the association, which is undenominational.

The Girls' Friendly Society seeks to band together girls and young women for mutual help, religious and secular, and to encourage purity, thrift, and afford help in cases of sickness. There were over 1000 branches and a membership of 131,084 in 1892. Associates must belong to the Church of England, but there is no such restriction in regard to members. The work is carried on by means of classes, clubs, registry offices, homes. There is also a Scottish Girls' Friendly Society, wholly undenominational.

Youngstown, a manufacturing town of Ohio, on the Mahoning River, 67 miles by rail SE. of Cleveland and 66 NW. of Pittsburgh, with blast-furnaces, rolling-mills, manufactories of machinery, &c. Iron, coal, and limestone abound near by. Pop. (1880) 15,435; (1890) 33,220.

Ypres (Flemish *Y'peren*), a Belgian town of West Flanders, on a fertile plain 30 miles SSW. of Bruges by rail, and 8 from the French frontier. Ypres was at one time one of the most important manufacturing towns in Flanders, the number of inhabitants in the 14th century being 200,000, and the number of looms 4000. Its staple manufacture was Diaper (q.v.). The only remnant of its once flourishing manufacture is the Cloth-hall (*Les Halles*), standing in the great market-place, in a rich style of Gothic architecture, and surmounted by a stately square tower or belfry, with a clock and chimes. It was built 1230–1342, and restored in 1860; a part was added in 1730. There are fine frescoes in the great hall, and many statues on the outside. One of the wings is now used as the *hôtel-de-ville*. The cathedral of St Martin is a fine Gothic edifice (1221-1350), with an altar of Carrara marble, a richly carved pulpit, and a picture doubtfully attributed to Van Eyck. The chief modern manufactures are thread and lace. Pop. 16,137. Ypres is a very old town, its origin dating from the 9th and 10th centuries. In 1688 it was strongly fortified by Louis XIV., and in the great European wars was frequently subject to sieges. Jansen (q.v.) was Bishop of Ypres.

Ypsilanti, a Fanariot family, claiming to be descended from the imperial stock of the Comneni. ALEXANDER (1725–1805), a dragoman at the Porte, was raised to be hospodar of Wallachia, but put to death on suspicion of stirring up Greek ambitions. —His son CONSTANTINE became also hospodar both of Moldavia and of Wallachia. Deposed in 1805, he came back with some thousands of Russian soldiers, stirred up the Servians to rebellion, and made

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eldest son, ALEXANDER (1783–1828), served with distinction in the Russian army in the campaigns of 1812 and 1813, and was chosen by the 'Hetairists,' a Greek secret society, as their chief in 1820. He headed a Rouman movement, but, defeated by the Turks, he was forced to take refuge in Austria. —His younger brother, DEMETRIUS, who was born 25th December 1793, also commenced his career in the Russian army, and joined his brother in his schemes for emancipating the Christian population of Turkey. In Greece he took part in the capture of Tripolitza (October 1820). His gallant defence of Argos stopped the victorious march of the Turks, and he stubbornly resisted (1825) the victorious Ibrahim at Napoli. In 1828 the grateful Hellenes made him commander-in-chief of their forces. He resigned in 1830, and died at Vienna, January 3, 1832.

Ypsilanti, a city of Michigan, on the Huron River, 30 miles by rail W. by S. of Detroit. It contains the state normal school, paper and woollen factories, flour-mills, canneries, &c. Pop. 6129.

Yriarte, CHARLES, a French author of Spanish ancestry, was born in Paris on 5th December 1832. He studied architecture, but from 1861 devoted himself chiefly to literature; his works, over twenty in number, dealing with Spain, Paris, the Franco-German war, Venice (Eng. trans. 1879), Florence (Eng. trans. 1882), Cæsar Borgia (1889), Isabella d'Este (1892), &c.

Ystad, a seaport in the extreme south of Sweden, 30 miles SE. of Malmö by rail; pop. 7500.

Ystradyfodwg, a township of Glamorgan, in the Rhondda valley, 19 miles NW. of Cardiff by rail, centre of a rich mining district. Pop. (1881) 55,632; (1891) 88,350.

Yttrium (sym. Y, atom. wt. 89), one of the rare metals, is contained in a few minerals in which there are usually also present compounds of one or more other rare metals such as cerium, didymium, erbium, and lanthanum. The minerals are Gadolinite, Yttrialite, Fergusonite, Cappelinite, Xenotime, Yttrotantalite, and one or two others. Gadolinite, which is largely silicate of yttria, contains from 36 to 46 per cent. of the oxide of yttrium, and occurs sparingly in Sweden, Norway, &c., but has of late been found in larger quantities in Texas. The metal yttrium has been obtained as a blackish-gray powder, but it has no very distinctive properties. The oxide yttria, Y_2O_3, is a yellowish-white powder. The hydrated oxide is thrown down by alkalies from solutions of the salts as a white gelatinous precipitate resembling alumina.

Yucatan, a Central American peninsula dividing the Gulf of Mexico from the Caribbean Sea, and bordering on British Honduras and Guatemala. It is a flat expanse, ridged only towards the east by a low chain of hills. The interior is overspread with forests of mahogany, rosewood, and other valuable timber, while the south and east teem with maize, pulse, rice, tobacco, indigo, coffee, the *henequen*, or Sisal hemp plant. Ruins of Uxmal, Chichen, Izamal, Mayapan, &c., consisting of temples and other vast edifices, richly carved and coloured, and of unknown history and meaning, testify to an ancient civilisation. Made known to Europe in 1517, and completely conquered in 1541, this part of New Spain (granted in 1783 to English logwood-cutters for a time; see DESPARD) continued under Spanish domination till 1821. After repeated short periods of independence it has since 1852 belonged to Mexico, as a single state till 1858, as two states, Yucatan and Campeachy, since that date. The state of Yucatan, the north-east part capital is Merida (q.v.).

See historical works by Cogolludo (1687), Sotomayor (1701), and Baqueiro (1868); Charnay, *Ancient Cities of the New World* (trans. 1887), Le Plongeon, *Yucatan: its Ancient Places and Modern Cities* (Brooklyn, 1889).

Yucca, a genus of plants of the natural order Liliaceæ, natives of the United States, Mexico, and Central America, some of which are often cultivated in gardens on account of the singularity and splendour of their appearance. *Y. gloriosa* is a native of Virginia and the countries to the south of it, but is quite hardy in England, so as to sometimes flower luxuriantly in the open air. It has a stem about 2 or 3 feet high, the upper part of which produces a great tuft or crown of large sword-shaped evergreen leaves, each terminating in a sharp black spine. From the centre of this crown of leaves arises the flower-stalk, of 3 feet or upwards in height, branching out on every side so as to form a great panicle. The flowers are white with a purple stripe. The other species, of which there are some twenty, have a general resemblance to this in habit and appearance. Some of them reach a height of 50 feet, with a stem 5 feet thick. The *Y. filifera* or *Y. vaccata* is called Spanish Bayonet or Mexican Banana, and yields an edible fruit. The fibre of the Yuccas is similar to that of the Agaves and Bromelias, and is used for coarse cloth and cordage.

Yucca gloriosa superba.
(From a Photograph taken in the open air near Edinburgh in 1890.)

Yukon, the great river of Alaska (q.v.), is formed by the junction of the Lewis and Pelly at Fort Selkirk, in British territory (62° 45′ N. lat.), and flows westward across the territory of Alaska into Behring Sea. Its length is some 2000 miles; in its lower course it is more than 20 miles wide, and throughout it is navigable, at least for small boats. But the deposits of mud and silt where it finally reaches the sea have formed a great delta which renders its lower course unfit for navigation, and prevents vessels at sea from approaching within 60 miles of its many mouths. During three months of the year its waters swarm with salmon, some 80 to 120 lb., and 5 to 6 feet long. These fish ascend the river for 1200 to 1500 miles.

Yule, the old name for Christmas, also still used provincially, as well as in such phrases as the Yule-log, Yule-cake, Yule-candle, Yule-dough, Yule-tide. It points to heathen times, and to the annual festival held by the northern nations at the winter solstice as a part of their system of nature-worship. For the general nature of the festival,

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and the way in which the observances were overlaid or transformed by the Christian institution, see CHRISTMAS. The word is not connected with Ice. *hjōl*, 'wheel,' nor yet with *yawl* or *yowl*, 'to howl' or 'cry.' The Anglo-Saxon form is *geōl*, cognate with the Ice. *jōl*.

Yule, SIR HENRY, Orientalist, was born at Inveresk near Edinburgh in May 1820. His father was a major in the Company's army, and after passing through Addiscombe he himself received a cadetship in the Bengal Engineers (1840). He served successively on the north-east frontiers, on the great irrigation works in the North-western Provinces, in surveys on the mountains between Arakan and Burma, as secretary to Sir Arthur Phayre's mission to Ava in 1855, and during the Mutiny in maintaining the railway communication up the Ganges valley. He was Secretary to Government in the Public Works department from 1858 till 1862, when he retired with the rank of colonel, and the year after was gazetted C.B. (civil). He lived some time at Palermo, sat on the Indian Council from 1875 until 1889, was made K.C.S.I. on his retirement, and died in London, December 30, 1889. He had received the LL.D. degree from Edinburgh in 1884, and was a corresponding member of the French Institute. He had been president also of the Hakluyt Society and of the Royal Asiatic Society. His articles in the *Journals* of the Geographical and Asiatic Societies were numerous, and he wrote valuable Introductions for Wood's *Source of the Oxus* (1872), Delmar Morgan's translation of Prejevalsky's *Mongolia* (1876), and Gill's *River of Golden Sand* (1880). His *Cathay and the Way Thither* (Hakluyt Society, 2 vols. 1866) was a collection of all the minor notices of China before the 16th century, and prepared the way for his magistral work, *The Book of Ser Marco Polo the Venetian* (2 vols. 1871; 2d ed. 1875). His next great work was the *Anglo-Indian Glossary* (1886), perhaps better known under its alternative title of *Hobson-Jobson*, with the collaboration of the philologist Dr Burnell, who died in 1882. His last work was the exhaustive notes (Hakluyt Society, 2 vols. 1888–89) contributed to the Society's reprint (1887) of the MS. Diary (1681) of William Hedges.

Yunnan, a province in the south-west of China, bounded on the S. by Annam, Siam, and Burma, with an area estimated at 122,000 sq. m., and a population, put by Mr Colquhoun at 4,000,000, having sunk from 15,000,000 through plague and the war of the Mohammedan Panthays which smouldered from 1855 till 1872. The surface is mainly an extensive uneven highland plateau, in which the main ranges trend north and south. Between these ranges, which vary in height from 12,000 to 17,000 feet in the north to 7000 or 8000 in the south, are numerous deep defiles through which run some of the largest rivers of Indo-China —the Mekhong or Cambodia, the Salween, and the Shwéli. Fertile plains and valleys are numerous. In the northern part the surface is wild, broken, and barren, wrapped in mist and fog, and the population sparse. But the south and south-west are populous and richly cultivated. Except in the cities the mass of the people is made up of aboriginal tribes, such as the Lolo, Pai, and Maiao. In the plains rice, maize, peas, beans, opium, tobacco, and sugar are the chief products—about a third of the whole cultivated area being given to the poppy. Almost the only import is cotton from the Shan states, but some British piece-goods reach the province from Canton. There is much mineral wealth as yet little wrought. The main routes available for tapping the wealth of Yunnan are (1) by the Yang-tsze River, from Shanghai; (2) by the Canton River, from Canton; (3) by the Songka River, from the Tongking gulf; (4) by the Bhamo route, from Bhamo on the Irawadi; (5) by some route from British Burma. Mr Colquhoun's judgment is that the last is the best—by railway from the side of Burma. The first important exploration was that of the French (1867–68). Later were Cooper in 1868, Dupuis in 1869–70, Margary (murdered 22d February 1875 at Manwyne, the last town on the Chinese border), Grosvenor and Baber in 1876, McCarthy and Captain Gill in 1879, Count Szechenyi in 1880, Colquhoun in 1881. See *Across Chrysê* (1883) by the last.

Yuruari. See VENEZUELA.

Yuste. See CHARLES V.

Yúsufzáis. See AFGHANISTAN.

Yverdon (also spelt *Yverdun*), a pleasant Swiss town of 6300 inhabitants in the Canton de Vaud, at the southern end of the Lake of Neuchâtel, 20 miles N. of Lausanne by rail. The old castle, built in 1135, was used by Pestalozzi (q.v.) as an educational institute; and is now occupied by municipal schools, a library, and museum. There is a sulphur-bath less than a mile out of the town.

Yvetot, an old town of France, in the dept. of Seine-Inférieure, 24 miles NW. of Rouen by rail. There are manufactures of linen, cotton, calico, and a trade in cattle and agricultural produce. The court and gaol occupy the site of a Bernardine monastery (1650–1781). Pop. 7007. The town and territory of Yvetot was long a semi-sovereign principality, and the Lord of Yvetot was popularly styled 'Roi d'Yvetot.' This singular dignity was formally abrogated in 1681, but the people of Yvetot retained some privileges till the Revolution. Beranger's well-known song, *Le Roi d'Yvetot* (1812), translated by Thackeray, was a satire on Napoleon. See a history by Beaucousin (1884).

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Z

the last letter in our alphabet, is derived, through the Greek *zeta*, from *zayin*, the seventh Semitic letter. The Semitic form was ⌶, which is also the Greek lapidary and numismatic form. But though in form and station *zeta* corresponds to *zayin*, yet through some confusion *san* acquired the name of *zayin* (*ds*), and *zeta* that of *tsade* (*ts*). In the old Italic abecedaria the letter Z occupies, like *zeta*, the seventh place, and the letter survived in Oscan, Umbrian, and Etruscan; but, as the sound did not exist in Latin, the letter was discarded, not later than the 3d century B.C., when its alphabetic station was usurped by the new letter G (see 'G'). In the 1st century B.C. it was reintroduced from Greece in the uncial form Z, in order to transliterate Greek words. Together with the symbol, the name *zed* was borrowed from that of the Greek *zeta*, whereas if the letter had been continuously retained in the Latin alphabet the name, following the analogy of the other Latin letters, would have been *ez*. It is curious that *zed*, the only Semitic letter-name that we retain, should have belonged originally to a Phœnician letter which has disappeared from every European alphabet. It can hardly be said that *z* was an Anglo-Saxon letter, as it is only used in biblical names, such as Zaccheus; even now it appears in very few native English words, the sound, when we have it, being usually represented by *s*, as in the words 'Wednesday,' 'thousand,' 'tongs,' 'weeds,' 'tease,' 'cheese,' 'knees,' 'these,' 'his' and 'is.' We use it chiefly for words of Greek, Hebrew, and Arabic origin, such as 'zoology,' 'zephyr,' 'zeal,' 'zany,' 'Zedekiah,' 'Zebulon,' 'azure,' 'zenith,' 'magazine,' 'gauze,' 'zero,' 'zodiac,' or 'gazelle.' Owing to French influence it has taken the place of *s* in a few English words, such as 'dizzy,' 'frozen,' 'hazel,' 'squeeze,' and 'sneeze;' and it represents a French *s* in 'hazard,' 'lizard,' and 'buzzard.' It is intrusive in 'citizen,' from the French *citoyen*. The sound of our *z* is a voiced sibilant, either a voiced *s* as in 'zeal,' or a voiced *sh* as in 'azure,' French sounds which we borrowed. The value in Latin and Greek is doubtful: probably it was either *dz* or *zd*. By Grimm's law a German *z* answers to an English *t* and a Latin *d*, as in the words *zwei*, *two*, *duo*; or *zahn*, *tooth*, *dens*. The cedilla (ç) is a 'little *zed*,' as is implied by the Italian name *zediglia*, from *zeticula*.

Zaandam, a town in the province of North Holland, on the Zaan, at its entrance into the Y, 5 miles NW. of Amsterdam by rail. Many of its wooden houses, mostly painted white or green, are separated by canals, and with their gardens round them look like little islands. It has many corn, oil, and saw mills, in whose products an active trade is maintained with the Baltic, Black, and White Seas; and also active manufactures of paper, dyes, starch, tobacco, and glue, and still a little shipbuilding. Most of the sixty wharves it had in the 17th century have disappeared, and its famous whale-fishery is also a thing of the past. Here in 1697 Peter the Great worked in one of the shipbuilding-yards as a carpenter, and the hut in which he lived is carefully preserved. It was visited in 1814 by the Czar Alexander. Pop. (1888) 14,545.

Zabern (Fr. *Saverne*), a town of Lower Alsace, 22 miles NW. of Strasburg by rail, once residence of the bishops of Strasburg. Pop. 6605.

Zabism. Under the name Zabians used to be grouped several peoples distinct in origin and by no means alike in religion. The mediæval Arabic, Jewish, and Persian writers, all starting from the notion that idolatry, star-worship, and *Sabæism* were identical, called nearly all those heathens or Sabæans who were neither Jews or Christians, nor Mohammedans or Magians. Now the name Sabæans (q.v.) denotes strictly the ancient inhabitants of southern Arabia, who were but little modified by Babylonian influences: the Zabians of the Koran were originally non-Christian Gnostics—the ancestors of the still existing Mandæans (q.v.) or Joannes' Christians. Again there were Pseudo-Zabians, or Syrian Zabians (in Haurân, Edessa, Bagdad), remnants of the ancient Syrian but Hellenised heathens, from about the 9th till the 12th century. They themselves derived their denomination from one Zâbî, variously called a son of Seth, of Adam, of Enoch or Idris, of Methuselah, or of some fictitious Badi or Mari, a supposed companion of Abraham. The name, however, was not native, but assumed, in order to evade Mohammedan persecution, from the people mentioned in the Koran. They were simply heathens who had to a certain extent adopted and modified Neoplatonist ideas, such as floated in the mental atmosphere of the early Christian centuries. These Zabians did not disappear before they had produced a host of men eminent in every branch of learning and literature, in philosophy, astronomy, history, natural history, poetry, medicine, and the rest. The Mohammedans had a high appreciation of Zabian learning, and explained it by tracing it to a supernatural source, notably to Hermes (Trismegistus), the father of the Zâbî mentioned above. The first to clear up the confusion about this people was Chwolson, in his masterly work, *Die Ssabier und der Ssabismus* (2 vols. St Petersburg, 1856).

Zacate'cas, capital of a state of that name in Mexico (q.v.), and a famous silver-mining town, is situated in a deep ravine, 440 miles by rail NW. of Mexico city. The streets are narrow and irregular, but there are numerous squares, and the market-place, where the cathedral stands, is wide and handsome. Three miles to the east is the Franciscan college where the fathers of the old Californian missions were trained. Zacatecas is the great silver-producing state of Mexico, and around the city 15,000 men are employed in the mines, which since 1540 have yielded over $1,000,000,000. Pop. of municipality, some 60,000, less than one-half in the city.

Zacharias, pope from 741 to 752, was a Greek by birth. He gave his consent to the setting aside of the Merovingian Childeric III. and the elevation to the throne of Pepin the Short (752). He

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Bartolini (1879) and I. Cozza-Luzi (1880).

Zadkiel, the name assumed by Richard James Morrison, the compiler of an astrological almanac, which was started by him in 1830, and which reached a yearly sale of from 100,000 to 200,000 copies. He was a retired commander in the royal navy, a Hebraist, mathematician, and astronomer, withal a real believer in his pseudo-science, as was brought out in his action for libel against Sir E. Belcher (1863). He was born about 1794, and died on 5th February 1874. See CRYSTALLOMANCY.

Zadonsk, a Russian town on the Don, 70 miles N. of Voronej, is the seat of a celebrated monastery. Pop. 9800.

Zadruga. See SERVIA, p. 326.

Zafarâni Islands, three islets off the north coast of Morocco, occupied by Spain. Pop. 703.

Zaffre. See COBALT.

Zagazig, a town of the Egyptian delta, capital of a district and an important railway centre, 50 miles NE. of Cairo, on a branch of the Sweetwater Canal connecting Ismailia with the Nile. It was occupied by the British troops immediately after the battle of Tel-el-Kebir. Pop. 19,046.

Zahn, THEODOR, a biblical scholar of unrivalled acuteness and learning, was born at Mörs in Rhenish Prussia, October 10, 1838; studied at Basel, Erlangen, and Berlin (1854-58); became *Repetent* at Göttingen in 1865, *privat-docent* in 1868, and professor extra-ordinary of Theology in 1871; and obeyed calls to Kiel in 1877, to Erlangen in 1878, to Leipzig in 1888, and back to Erlangen in 1891. Of his writings the most important are *Marcellus von Ancyra* (1867), *Der Hirt des Hermas* (1868), *Ignatius von Antiochien* (1873), *Acta Joannis* (1880), and *Cyprian von Antiochien und die Deutsche Faustsage* (1882), which worthily prepared the way for those splendid comprehensive works devoted to the New Testament Canon which have placed him first amongst the scholars of his time—*Forschungen zur Geschichte des Neutestamentlichen Kanons* (4 vols. 1881-91), including *Tatian's Diatessaron*, &c.; and the *Geschichte des Neutestamentlichen Kanons* (vols. i.-ii. 1889-91). Together with Gebhardt and Harnack he edited the *Patrum Apostolicorum Opera* (3 vols. 1876-78).

Zähringen, a small village a mile N. of Freiburg in Breisgau, historically noteworthy for the ruined castle of the dukes of Zähringen, the ancestors of the reigning House of Baden (q.v.).

Zaire. See CONGO.

Zaleucus, the legendary lawgiver (*c.* 750 B.C.) to the Epizephyrian Locrians, the Locrians who colonised the SW. extremity of Italy.

Zama, a city and fortress in Numidia, about 100 miles SW. of Carthage, near which Hannibal (q.v.) was defeated by the Younger Scipio, 201 B.C.

Zambesi, Vasco da Gama's 'River of Good Signs,' which ranks with the Congo and the Nile as a means of communication with the interior of Africa. A highway for the nations of the world, the river, which is between 1550 and 1600 miles long, is an important factor in the development of South Africa. Immediately after its rise in the marshy country to the west of Bangweolo it passes through Lake Dilolo at the extreme south-west point of the Congo Free State, about 22° 20′ E. long. and 11° 40′ S. lat. On its way to the Indian Ocean the Zambesi drains more than half a million square miles of territory. It receives many tributaries, notably the Loamba, Kafue, Loangwa, and Shire, by which last named the British lake country and Equatorial Africa are approached from the south. For about two-thirds of its length from tected territory, entering the Portuguese possessions near Zumbo. Owing to many cataracts, narrows, and rapids, navigation is only clear for stretches of 100 or 200 miles. Small steamers may go from the mouth as far as the Kebrabassa Falls. Above that point the river, which has a very noble aspect at some parts, is navigable with occasional interruptions till the Victoria Falls are reached, 900 miles from the sea. These falls, as great and grand as those of Niagara, were discovered and named in 1855 by Dr Livingstone; the native name being Mosioatunya or, at an earlier date, Shongwe. The river, which is here 1000 yards broad, drops sheer into a huge fissure in the earth's surface nearly 400 feet deep. Beyond this for 700 miles the river forms a partial waterway to the interior. The delta of the Zambesi comprises an area of 2500 sq. m., and it has a number of mouths all more or less blocked with sand. Those named the Chinde and Kongoni are used for entering the Zambesi. The former has a length of 18 miles from the sea to its junction with the great river. Sena, an important town, 130 miles from the ocean, is on the south bank of the Zambesi; and Tete, 190 miles farther, near the Kebrabassa Falls, is a trading centre for gold and ivory. Zumbo, another trading station, is 550 miles from the sea. Two British gunboats are now placed on the Zambesi.

Zambesia, that portion of the territory watered by the river Zambesi which is now under British protection. It is also becoming generally accepted as a loose definition of the country under the sway of the British South Africa Company. South Zambesia (southwards of the river) embraces Mashonaland (q.v.), Matabeleland (q.v.), a part of Manica, and the country of Khama, the Christian chief of the Bamangwatos. North Zambesia (northwards of the river) extends to Katanga, Lake Tanganyika, and its eastern boundary is the western shore of Lake Nyassa. The Shire Highlands are also within its limits. A royal charter was granted to the British South Africa Company in October 1889. Its first clause describes the principal field of the operations of the company to be the region 'lying immediately to the north of British Bechuanaland, and to the north and west of the South African Republic, and to the west of the Portuguese dominions.' The company was formed with the Dukes of Abercorn and of Fife for president and vice-president, and the Hon. Cecil J. Rhodes (q.v.), Premier of the Cape Colony, for managing director. The land which the company now governs was till recently almost a sealed book to all but the most adventurous of sportsmen, who hunted the big game of south Central Africa; it was the land in which Moffat and Livingstone carried on their missionary labours. The arduous but successful march of the police and pioneers of the chartered company into Mashonaland, and their establishment of fortified outposts, which were ultimately to grow into townships, was a brilliant and brave achievement worthy of a picked body of gallant Britishers. Salisbury, Victoria, and Umtali are already thriving centres of population, and the gold-mining industry—a revival of an enterprise engaged in in the country by an ancient race (see ZIMBABYE)—bids fair to become an important one. A railway in course of construction in 1892 into the country from a point near the adjacent Portuguese port of Beira is expected to assist in the mineral and agricultural development of a large extent of the plateau-region of south Central Africa. See *Zambesia, England's El Dorado in Africa*, by the present writer, E. P. Mathers (1891).

Zamia. See CYCADS.

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Zamora, a very ancient town of Spain, capital of a province, is on the Douro, 150 miles NW. of Madrid by rail. It is the see of a bishop suffragan of Santiago. Zamora was of great importance in the Moorish times, was strongly fortified, and has many interesting remains of mediæval architecture. The cathedral is a late Romanesque edifice. There are some linen and woollen manufactures. It has never recovered the devastations of the French (1808–9). Pop. 15,209.

Zamosc, a fortified town of Russian Poland, 154 miles SE. of Warsaw. Pop. 7725.

Zanella, GIACOMO, Italian poet, was born in 1820 at Chiampo, entered the priesthood, and had already filled scholastic offices at Venice and Vicenza, when in 1866 he was placed in the chair of Italian Literature at the university of Padua. He retired from ill-health in 1872, and died at Vicenza, 17th May 1888. As a lyrical poet Zanella stands amongst the foremost of his contemporaries, marked especially by refinement of style and the poetisation of the results of modern science, as in his famous poem, 'La Conchiglia fossile.' His collections have been *Versi* (1868); *Il piccolo Calabrese*, a narrative poem (1870); *Poesie* (1877); *Nuove Poesie* (1878), &c. He also published *Scritti vari* (1877), *Parallele letterarie* (1884), and *Della letteratura Italiana nell' ultimo secolo* (1885).

Zanesville, capital of Muskingum county, Ohio, on the Muskingum River, at the mouth of the Licking, 67 miles by rail E. of Columbus. The river is navigable for steamboats to this point, and is crossed by an iron railway bridge 538 feet long, and by several others to its suburbs, Putnam and West Zanesville. It has rich coal-mines close by, and manufactures extensively engines and boilers, flour, iron, cottons and woollens, glass, paper, tiles, &c. Pop. (1880) 18,113; (1890) 21,009.

Zanguebar. See ZANZIBAR.

Zan'te (anc. *Zacynthos*), one of the principal Ionian Islands, 9 miles from the north-west coast of the Morea, and 8 south of Cephalonia, is about 24 miles long, 12 broad, and has a pop. of 44,522. In the west it attains a maximum altitude of 2486 feet; the centre is fertile, formed by depression, and is mainly devoted to the growing of the dwarf species of vine, originally brought from Corinth, from which *currants* are produced. Zante is mentioned in Homer with the epithet 'woody,' which is not apt at the present day, although it is justly called in an Italian proverb 'the flower of the Levant.' It is not volcanic, although thought to be so by the natives from the pitch-wells and the not infrequent earthquakes. A large quantity of currants is exported annually (1889, 12,367 tons), mostly to England, where, according to Lithgow the traveller, they were first introduced from Zante about 1550.—ZANTE, the capital, the largest town in the Ionian Islands, is situated at the head of a small bay or harbour on the east coast. It is the see of a Greek protopapas, and of a Roman Catholic bishop. Pop. 17,000. See IONIAN ISLANDS, and Professor Partsch in *Petermanns Mitteilungen* (1891).

Zanzibar, a kingdom of East Africa, including, as delimited in 1886, the islands of Zanzibar (625 sq. m.), Pemba (360), Mafia (200), and Lamu (35), and a strip of coast, extending 10 miles inland, from Cape Delgado (10° 40′ S. lat.) to Kipini (2° 40′ S.). In 1888, however, the German East African Association acquired the right to administer the mainland portion from the Umbu River (4° 45′ S.) southward, and the British East Africa Company obtained all the coast northward, for an annual payment. In 1890 the British portion was extended to the mouth of the Juba (q.v., 0° 5′ S.), and the islands were made a British protectorate; at the same time Germany bought its portion of the mainland outright for four million marks. Zanzibar Island (*Unguja*), separated from the mainland by a deep channel, rests upon a coral foundation, and rises in the interior to 425 feet. The hills bear oranges, cloves, &c., and on the plains rice, manioc, sugar-cane, sorghum, &c. are grown. Of a total population of some 125,000 nearly 100,000 are in the town; the people are mostly negroes, but the governing class are Arabs, and many foreign traders are settled in the capital —about 100 British, many Germans and French, several hundred from Goa, &c. The religion is Mohammedanism, but a number of Christian missions have been established, both here and on the mainland. The capital, situated on an island-studded bay on the west side of the island, is the only large town and trading-port on the east coast of Africa; it is a station of the British India Steam Navigation Company, and of the Messageries Maritimes, and numerous craft flying the French flag trade to Madagascar. The imports (about a third from Bombay) average £1,300,000—cottons, coal, hardware, kerosene, soap, rice, flour, &c., and products from German East Africa; the exports of African products sent abroad and of European goods distributed along the coast are returned at £1,350,000, but this excludes goods transhipped in the harbour, and moreover no trustworthy record is made of the dhow trade. In African produce passing through Zanzibar ivory takes the first place; next follow rubber, hides, copal, tortoise-shell, wax, cloves, archil, &c. The sultan's privy purse is fixed at three lakhs of rupees, derived mainly from customs dues, &c.; the balance of the state's income is applied for police, public works, and the like. The police, along with the army of 1200 men, are under a British officer.

The territory of the Imperial British East Africa Company (I.B.E.A.) extends westward to the Congo Free State, and embraces the watershed of the Nile; about 400 miles of coast is now under its control.

Zanzibar means 'land of the Zenj,' a reigning dynasty, probably of Swahili origin, who ruled a somewhat indefinite area of the African coast regions. Ultimately *Zanguebar* was the term usually given to the continental portion as distinguished from the island. There were Arab settlements in various places as early as the 10th century. By the end of the 15th century the Portuguese made their influence felt, and in 1503 were recognised by the Mohammedans on the island as paramount. In the 17th century the Portuguese lost most of their dominions north of Mozambique to the imam of Muscat, and many small states were founded. About 1856 Seyid Medjid, a son of the imam of Muscat, became practically independent sultan of Zanzibar, and consolidated a considerable state, which in 1870 descended, gradually dwindling, to his brother Bargash, in 1888 to another brother Khalifah, and in 1890 to still another, Sayyid Ali.

See Stanley's and Joseph Thomson's books; Burton, *Zanzibar City, Island, and Coast* (1872); Rabaud, *Zanzibar* (Marseilles, 1881); K. W. Schmidt's *Sansibar* (Leip. 1887); and Silva White's *Development of Africa* (1890); also the articles UGANDA, WITU.

Zápolya. See HUNGARY, Vol. VI. p. 6.

Zaporogians. See COSSACKS.

Zara (Slav. *Zadar*), capital of Dalmatia, on the coast of the Adriatic, 130 miles SE. of Trieste. It is built on a narrow promontory, separated from the mainland by a moat. There is a spacious and well protected harbour, and till 1873 the place was strongly fortified. Of its churches the most note-

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founded by Henry Dandolo, Doge of Venice, and the church of the patron saint, St Simeon. A lofty marble column is all that is left standing of an ancient Roman temple; there are also the remains of a Roman aqueduct. The chief manufactures are the making of glass and of maraschino and rosoglio. Pop. 11,861, mainly Italians.

Zarafshan. See BOKHARA.

Zaragoza. See SARAGOSSA.

Zarncke, FRIEDRICH, Germanist, was born at Zahrenstorf near Brüel in Mecklenburg-Schwerin, 7th July 1825. He studied at Leipzig and Berlin, settled at Leipzig in 1850, founded the *Litterarisches Zentralblatt für Deutschland*, and became in 1858 ordinary professor of German Language and Literature at the university there. Here he died, 15th October 1891. His writings include a treatise on the German *Cato* (1852); an edition of Brant's *Narrenschiff* (1854); treatises on the *Nibelungenlied* (1857), and many contributions to a knowledge of such mediæval German writings as the Old Saxon *Hêliand*, the O. H. Ger. *Muspilli* and *Georgslied*, &c., in the *Abhandlungen* of the Saxon Academy of Sciences, and elsewhere; mediæval poetical proverbs (1863–65); the history of Leipzig university (1857), and the mediæval German universities (1857); and Prester John (in various dissertations, 1876–79 *et seq.*). Other works were a study of Christian Reuter (1884) and his *Kurtzgefasstes Verzeichniss der Originalaufnahmen von Goethes Bildniss* (1888).

Zarskoe. See TSARSKOYE SELO.

Zaruma, a town of Ecuador, on the west slope of the Andes, 95 miles S. of Guayaquil. It has gold and quicksilver mines, and grows cane and fruits for sugar. Pop. 6000.

Zea. See CEOS; and for the grain, see MAIZE.

Zealand (Dutch *Zeeland*), a province of the Netherlands, consists of portions of Flanders (East and West) and of the islands Walcheren, North Beveland, South Beveland, Schouwen, Duiveland, and Tholen, with an area of 690 sq. m. and a pop. (1889) of 199,234, about three-fourths Protestants. The provincial capital is Middelburg: Flushing is also in Walcheren. The greatest part of the soil, which is a rich clay, has been redeemed from the sea; and the number of Polders (q.v.), or drained districts, is about 400. The neighbouring seas abound with fish, and in Schouwen many eggs are collected, myriads of water-fowl resorting thither to form their nests. In 1866 a ship-canal through the island of South Beveland was made to take the place of the Easter Scheldt. Hence came the name of New Zealand (q.v.).

Zealand (Dan. *Själland*), the largest and most important island of Denmark, lies between the Cattegat and the Baltic, and is separated by the Sound from Sweden and by the Great Belt from Fünen. Length, 81 miles; extreme breadth, 67 miles; area, 2670 sq. m.; pop. (including the small islands of Mören, Samsö, &c.) 721,703. The surface is nearly everywhere flat, except in the northern peninsulas; the coasts, which are rockbound on the south-east, are indented by bays and fiords, the chief of which is the Roeskilde-Isefiord in the north. The rivers are small, but there are numerous lakes, and all the waters abound in fish. The island contains several beech-forests, is exceedingly fruitful in corn (particularly barley and rye), and breeds excellent horses and cattle. Agriculture and cattle-breeding are the principal employments of the inhabitants. The chief place is Copenhagen (q.v.), on the east coast; the next in rank and size are Elsinore in the north and Korsör in the south-west.

inland route from Hodeida to Mocha, from which last it is 60 miles north. Once famed for its commerce and its learning, and the seat of a long line of princes, it has now but some 7000 inhabitants.

Zebra, a generic name given to the group of striped Equidæ—all of which are peculiar to the African continent—and thus including the Dauw or Burchell's Zebra (*Equus burchelli*) and its variety *Equus chapmani*, a species inhabiting the plains of the interior, the Quagga (q.v.), and the true or Mountain Zebra (*Equus Zebra*). The type of the entire group is more asinine than equine, and in the true zebra the ass-like character is heightened by the longer and fuller ears and the barer tail—the latter furnished only with long hairs towards the tip, the tail of the quagga and Burchell's zebra being equine and flowing. In all the hind-legs are without warts. The true or Mountain Zebra, *Equus* or *Asinus Zebra*, the *Wilde Paard* (wild horse) of the Cape Dutch, stands about 12 hands high at the shoulder, and is of a strong and muscular yet beautifully symmetric form. The body colour is of a silver white, and the black markings, which are fuller and more even than in the other members of the group, extend to every part of the body except the stomach and inner part of the thighs. Even the legs are closely ribboned in black and white down to the hoofs. Upon the light, clean head (with the exception of the ears, upon which the black and white markings continue) the markings change to brown, while the muzzle is of a rich bay tan. The mane is hogged and upstanding, but somewhat less shaggy than in Burchell's zebra. The legs are short, clean, and wiry, yet well proportioned to the

Zebra (*Equus Zebra*).
(From a Photograph by Gambier Bolton, F.Z.S.)

sturdy frame. The true zebra runs in small troops and inhabits the most rugged and inaccessible mountain-ranges of South Africa and Abyssinia, and, it is believed, is found in no other part of the continent. It has been identified as far to the east as the Libomba Mountains between Swaziland and the seacoast, and westwards upon the ranges of Great Namaqualand. Formerly abundant upon every range of the Cape Colony, its occurrence there is now much more restricted, and will, apparently, not long hence cease entirely. Its activity and surefootedness are remarkable, its senses of sight, smell, and hearing very acute, and the least alarm is sufficient to send the whole herd scampering off, with pricked ears and whisking tails, to inaccessible retreats among the mountains. The zebra has been

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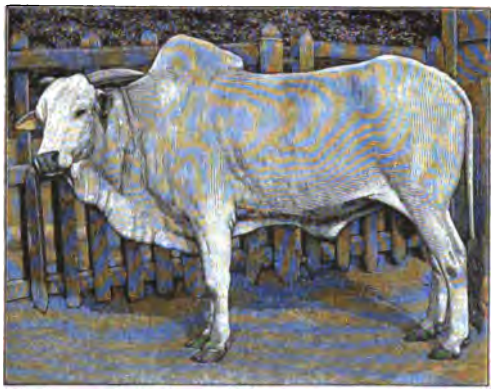
domesticated and driven in harness, and in the old days the young were for this purpose captured by the Boers and exported to Mauritius; but even when taken young the temper is always vicious and uncertain. A new variety of the true zebra (differing in some respects from the South African type, especially in its closer and finer markings), supposed to have been captured in the highlands of Shoa, north-east Africa, was presented by Menelek, king of Shoa, to President Grévy in 1882. This variety has been named *Equus Grévyii*.

Zebu (*Bos indicus*), a kind of ox very nearly allied to the common ox, of which naturalists generally regard it as a mere variety, although some think it a distinct species. It is also called Indian Ox or Brahmin Ox. The most conspicuous distinctive character is a large fatty hump on the back above the shoulders. The legs are also rather more slender and delicate than in the European ox. The hump attains a very great size in animals plentifully supplied with food and not compelled to work; in those which are ill fed or hard worked it is comparatively small. Mr Vasey found the number of caudal vertebræ in the zebu to be only eighteen, whilst in the common ox it is twenty-one. The zebu is diffused over India, China, the Asiatic Islands, Madagascar, and the east coast of Africa. There are many breeds, differing very much in size,



Zebu (*Bos indicus*).
(From a Photograph by Gambier Bolton, F.Z.S.)

the largest being larger than any oxen of Europe, whilst the smallest are not much larger than a large mastiff. The hump of the largest breeds is said to be sometimes 50 lb. in weight, and by English residents in India is esteemed delicious for the table. There are hornless breeds; but most of the breeds have short horns. There is a breed with two fatty humps, one placed immediately behind the other. In China is a small variety combining the characters of *Bos indicus* and *B. taurus;* the hump is very small. The voice of the zebu resembles the grunting of the yak almost as nearly as the lowing of the ox. The zebu is used in India both as a beast of draught and of burden, is yoked in the plough, and is occasionally used for riding. It can travel from 20 to 30 miles a day, and is very gentle and docile. The Brahminy or sacred bulls of the Hindus, consecrated to Siva, are all of this kind of ox. They are caressed and pampered by the people, and to feed them is deemed a meritorious act.

Zebu, one of the Philippine Islands (q.v.).

Zecchino. See DUCAT.

Zechariah, 'the son of Berechiah, the son of Iddo' (the priest of Neh. xii. 4), was born in Babylonia during the captivity, and accompanied the first band of exiles on their return to Judæa under Zerubbabel and Joshua. Nothing further is known of his personal history except that, along with Haggai, in the second and fourth years of Darius Hystaspis (520–518 B.C.), he as a prophet stirred up the languishing enthusiasm of the Jews to complete the rebuilding of the temple. Of the book that bears his name (eleventh in order among the twelve minor prophets) only the first eight chapters are really attributable to him. They consist of three parts under three separate dates: i. 1–6; i. 7–vi. 15; and vii., viii. The first is a brief exhortation to repentance; the second, forming by far the larger portion of his prophecy, is made up of eight visions relating to the speedy rebuilding of the temple, the scattering of Israel's enemies, the future greatness and glory of Jerusalem, the priestly dignity of Joshua and the advent of the Messiah, the removal of all wickedness out of the land, and the execution of God's judgments on Babylonia; the third contains a hopeful deliverance on the question as to the permanence of fast days, and gives a bright picture of the Messianic future.

The remaining six chapters of the Book of Zechariah are now regarded with practical unanimity as being really anonymous: they have a different horizon, belong to a different school of prophecy, and are separated also by their language and style from the compositions of Zechariah 'the son of Iddo.' They must have been added to the growing book of the minor prophets at a time when the genuine prophecies of Zechariah had already become part of it, and thus according to the usual custom of those times came to be attributed to the last preceding writer whose name was known. They naturally fall into two sections now commonly attributed to two distinct authors. The first of these, consisting of chapters ix.–xi., to which it has been usual, since Ewald, to add xiii. 7–9, may be thus analysed: ch. ix. predicts the judgment about to fall on Damascus, Hamath, Tyre, Sidon, and Philistia, and foretells the advent of the Messiah, the restored prosperity of Judah and Ephraim, and their triumph over the sons of Greece; ch. x. exhorts to trust in Jehovah and warns against 'teraphim and diviners,' through whom Israel has fallen under unworthy rulers; new and better rulers are to be raised up, under whom Judah and Ephraim are to be reunited; ch. xi. begins with allusions to war in the north and east, but is chiefly occupied with the difficult allegory of the shepherd, to which also xiii. 7–9 seems to belong. Among modern critics the prevailing opinion until very lately has been that these chapters belong to the second half of the 8th century B.C. In support of this view it is pointed out that the northern kingdom is still apparently in existence, that Assyria and Egypt figure much as they do in Amos, Hosea, and Isaiah, and that the teraphim and diviners also indicate a comparatively early date. But there are other circumstances, on the other side, that point to a rather late date after the exile, the most important being the reference to the Greeks, which would be most appropriate to the Macedonian period. Driver accordingly inclines to think, with Cheyne and Kuenen, that, while the prophecy as a whole dates from the 8th century, it was yet modified in details, and accommodated to a later situation, by a prophet living in the post-exilic period when the Greeks had become formidable to the Jews. As for ch. xii. 1—xiii. 6; xiv., this section of the book used to be assigned to the last days of the Judean kingdom, but is now very generally considered to be post-exilic. It presupposes a state of matters in Judah and Jerusalem of which we have no knowledge, but which may possibly have occurred during one or other of the obscure periods 518–458 or 432–300 B.C.

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date for this section. As regards all six chapters, though assigning them to two separate authors, Wellhausen argues for a very late date—as low indeed as that of Antiochus Epiphanes—on a variety of grounds, such as the type of eschatology employed (which was that introduced by Ezekiel), the importance assigned to the temple service, the absence of an actual Davidic king, the allusions to the 'race of Ashdod' (comp. Neh. xiii. 23, 24), to Greece, and to idolatry (of which there was a revival late in the Macedonian period). The presence of phrases suggestive of the older prophecy, and the allusions to Ephraim, Assyria, and the like he explains by the desire of the author 'to give his oracles an archaic garb,' thus inverting the theory of Kuenen, Driver, and others that the oracles are really old, but with later elements superadded. The evidence is certainly conflicting, and the problem may perhaps ultimately prove insoluble with the limited data at command.

See the commentaries of Hitzig-Steiner (1881), Ewald, Keil (Eng. trans.), and Orelli; also C. H. H. Wright, *Zechariah and his Prophecies* (1879); Wellhausen's article 'Zechariah' in *Ency. Brit.*; the same author's *Die Kleinen Propheten übersetzt mit Noten* (1892); and Driver's *Introduction to the Old Testament* (3d ed. 1892), where further references to the literature of the subject are given.

Zechstein, a deposit of calcareous rock which covers the Kupfer-schiefer. It is the equivalent in Thuringia of the fossiliferous limestones of Permian age of the north of England. See PERMIAN SYSTEM.

Zedekiah. See JEWS, p. 323.

Zedlitz, JOSEPH CHRISTIAN VON, poet, was born at Johannisberg in Austrian Silesia, 28th February 1790, and served with distinction in the 1809 campaign at the battles of Regensburg, Aspern, and Wagram. He afterwards entered the service of the Austrian foreign office, and was commissioner in Vienna for Sachsen-Weimar, Oldenburg, and other German states. He died at Vienna, 16th March 1862. His dramas—*Kerker und Krone*, *Der Stern von Sevilla*, &c.—were long popular; but his name best survives in his lyrics of reflection and narrative—e.g. *Totenkränze* and *Die nächtliche Heerschau*—and in his poetical tales, *Waldfräulein* and *Altnordische Bilder*.

Zedoary (Arab. *Jedwar*), certain species of Curcuma (see TURMERIC), natives of India, China, &c., whose root-stocks (*rhizomes*) are aromatic, bitter, pungent, and tonic, and are used for similar purposes with ginger. They are more used in the East than in Europe. The Round Zedoary of the shops is the produce of *Curcuma zedoaria*, having palmate root-stocks, straw-coloured within. Long Zedoary is produced by *C. zerumbet*, having long palmate root-stocks, yellow within. Zedoary is a powerful sudorific.

Zeehan (Dutch *Zeehaan*, 'sea-hen'), a mining township on the west coast of Tasmania, 29 miles by rail from the port of Strahan on Macquarie Harbour. The name is taken from a prominent mountain, 3 miles south-west, which Tasman discovered in 1642, and christened Mount Zeehan, after one of the two ships which formed his expedition. The township owes its existence to the discovery in 1884, by two pioneer prospectors named Frank H. Long and William Johnstone, of rich silver-lead ores in great abundance, extending over an area of more than 160 sq. m., approaching at its north-eastern limit the peak known as Mount Dundas, where a subsidiary camp has been formed. In 1889 about 130 pioneers were encamped on the field, and in April 1891 this population had increased to upwards of 3000. Hotels, as a post-office, mining exchange, court-house, police-office, and other concomitants of a populous centre. The field in fact was feverishly 'rushed' beyond both the capital and labour resources of the colony, till at the close of 1891 the population was estimated at upwards of 6000, and Zeehan ranked as the third town of the island. With the stoppage of the bank of Van Diemen's Land in August 1891 the unwholesome element of speculation received its first check, and the exodus of drones which followed, while reducing the population, did much to restore a healthy tone to the paramount industry of the district. British and colonial capital has been largely attracted by the extraordinary wealth of the field, and public ore-dressing and smelting works for local treatment of the poorer ores have been erected. The Mount Zeehan Silver-lead Mines, the largest company in the field, had by the end of 1892 exported to England 600 tons of ore, containing 400 tons of lead, and upwards of 60,000 ounces of silver, valued at £25 per ton.

Zeeland. See ZEALAND.

Zeitun, a town 25 miles NW. of Marash in the highlands of the Aleppo province, with iron-mines and some 20,000 inhabitants, mainly Armenian Christians, who have strictly maintained themselves for centuries against Turkish oppression.

Zeitz, a walled town of Prussian Saxony, in the government of Merseburg, 23 miles SW. of Leipzig by rail. It lies in a pleasant and fruitful district on the right bank of the White Elster. The town has a good library, containing 12,000 volumes, and manufactures of woollens, cottons, calicoes, sugar, wax-cloth, leather, pianofortes, cycles, hosiery, gloves, &c. Pop. 19,797.

Zell, or CELLE, a town of Prussia, on the navigable Aller, 28 miles by rail NE. of Hanover, with an active trade and considerable manufactures. From the 14th century it was the residence of the dukes of Brunswick-Lüneberg of the Celle line until the extinction of that branch in 1705; and in the old castle (1485) George III.'s unfortunate sister, Caroline Matilda of Denmark, lived from 1772 to 1775, and here she is buried. The peace of Celle (1679) declared Sweden's adhesion to the peace of Nimeguen. Pop. 36,762.

Zeller, EDUARD, theologian, and the historian of Greek philosophy, was born at Kleinbottwar in Würtemberg, January 22, 1814, studied at Tübingen and Berlin, and settled at Tübingen in 1840 as *privat-docent* in theology. In spite of the strenuous opposition of the more orthodox party he became professor of Theology at Bern in 1847, and at Marburg in 1849, whence he was called to the chair of Philosophy at Heidelberg in 1862, at Berlin in 1872. Perhaps the ablest of the direct disciples of his father-in-law Baur, he forsook theology and his early Hegelianism for historical work which he has carried on in a most impartial and eclectic spirit.

Of his writings the following are the most important: *Platonische Studien* (1839), *Die Philosophie der Griechen* (3 vols. 1844–52; 4th ed. 5 vols. 1876–81), *Das theologische System Zwinglis* (1853), *Die Apostelgeschichte kritisch untersucht* (1854; Eng. trans. 2 vols. 1875–76), *Vorträge und Abhandlungen* (1865; 2d ed. 1875–77–84), *Staat und Kirche* (1873), *David Friedrich Strauss* (1874), *Geschichte der Deutschen Philosophie seit Leibnitz* (1872), *Friedrich der Grosse als Philosoph* (1886), *Grundriss d. Gesch. d. Griech. Philosophie* (1883; Eng. trans. 1886). His magistral work on Greek philosophy was translated into English in the following divisions: *Socrates and the Socratic Schools* (1868); *Stoics, Epicureans, and Sceptics* (1870); *Plato and the Older Academy* (1876); *The Pre-Socratic Philosophy* (2 vols. 1881); *The Eclectics* (1883).

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Zemindar (Persian), under the Mogul emperors of India, the farmer of revenue from land held in common by the cultivators, as responsible for the revenue, who was in many parts of India treated by the English as landlord, giving rise to the Zemindari system (see INDIA, Vol. VI. p. 115). The zemindar is now in those regions the actual native proprietor.

Zemstvo. See RUSSIA, Vol. IX. p. 37.

Zemzem. See MECCA.

Zenana (Hindustani *zanâna* or *janana;* Persian *zanan*, 'women'), the apartments in which Indian women are secluded, corresponding to the *harem* in Arabic-speaking Moslem lands. In India the Mohammedan women are much in the same position as the women in the other less bigoted Mohammedan countries. Amongst those of the Hindu faith the women of all castes are more or less secluded. Especially among the well-to-do and wealthy and in the higher castes the women were strictly confined to the apartments reserved for them—often those looking into an inner quadrangle—and were never to be seen in public. This usage, like many Hindu usages, does not seem to be based on the oldest Hindu scriptures; but it has been very strictly observed till of late, when the influences of European education and zenana missions have, in the larger towns, done much to relieve the monotony of the Hindu women's lives. Till about 1860, when zenana missions were organised in Bengal by Mr Fordyce, Christian women were not allowed to enter a Hindu zenana. Now thousands of Hindu ladies are taught by British, American, and native Christian women, some of whom are completely trained medical missionaries.

Zend, a word meaning 'commentary' (*zend* = *zand*, from Sansk. *jñâ*, 'to know'), which is a misnomer of European origin when applied (as seems now inevitable) to the ancient East-Iranian and purely Aryan language, in which the Zend-Avesta was long orally preserved and at last written. 'Zend' is closely related on the one side to the Vedic Sanskrit, of which it has been called the elder sister, and on the other to the Ancient Persian (its still younger sister) on the Behistun and Persepolis inscriptions. Its alphabet was elaborated (probably a thousand years after the composition of the Old Avesta, and for the particular purpose of preserving it) out of the obscurer Pahlavi (Pehlevi) forms, which have been still retained in its translations or commentaries. Parsi is the daughter-language of Zend, but showing a quasi-hybrid character by the admission of some Semitic elements; it is written either in the Zend character or the Perso-Arabic. Pahlavi may be said to be the same language, but rendered difficult by the use of the most obscure of all characters, and by the presence of some hundreds of logograms which were spoken Aryan but written Semitic, *Malkân Malkâ* ('king of kings') being spoken *Shâhân Shâh*. A knowledge of their languages as well as the Vedic Sanskrit is essential to the complete criticism of the Avesta, many correct definitions not suggested by Vedic analogies being offered by their uses.

ZEND-AVESTA, the 'commentary lore' (*zend*, as above; *Avesta* or *Avista* being regular for *Avitta* (*vid*); Pahlavi *Avistâk va Zand*), comprises the ancient sacred writings of the Parsees, which, however, appear in no one MS., and are marked only by their language and general subject as a homogeneous whole. They occupy with their repetitions about a hundred thousand words, although there is good evidence that they were many times more voluminous, twenty-one books like the Vendîdâd having once existed and been lost. Like other sacred documents, they include works of widely differing character and age, representing the Zoroastrian religion at several differing stages in its development; they were collected into their present canon under Shahpuhar II. (Shahpur II.; 309–338 A.D.), having also received the attention of the Persian government in the non-Zoroastrian (Arsacid) period under Valkhash (Vologeses I.), a contemporary of Nero. The *Yasna* (sacrifice-liturgy) is itself a grouping together of important documents surrounding the Gâthas, which as the only original and historical part, separated from all the other surviving documents, are by centuries the oldest and also otherwise the most important part of the Yasna and of the Avesta. The *Visparad* ('all the seasons,' or 'chief objects worshipped at the seasons') seem to have been additions to the several chapters of the Yasna (see the Vendîdâd Sâde, where they are mostly so written). They celebrate each sacred object as for the moment 'chief of the ritual.' The *Vendîdâd* (*vi-daêvo-dâtâ*, 'laws established against the Demons') is again a compilation of widely differing matter, including valuable myths and extensive prescriptions for the exorcism of the Demon of putrefaction, together with more serious laws, while the *Yashts* are mostly invocations addressed to particular divinities. The *Niyâyishes* are daily praises to the sun, moon, water, fire, &c.; the *Afrînagân* are blessings repeated six times in the year over certain meals in memory of the dead; the *Gâhs* are prayers at the five watches of the day and night; the *Sîrôzah* enumerates the attributes of the spiritual beings who preside over and give names to the thirty days of the month; and then there are later fragments.

A separation of these parts, especially of the two great divisions of Old and New Avesta, is indispensable to all serious consideration of the work, and the very regrettable but wide-spread neglect of such a distinction has simply left the lore of the original Avesta, the Gâthas, for the most part wholly lost in the nature-worship and superstitions of the later books. In the original Avesta none of the polytheistic features of the Veda and later Avesta appear. There is no sun-worship, nor moon-worship as noted above, no star-worship, nor Mithra-worship, nor Tishtriya(Sirius)-worship, and no Haoma-worship. There are even no Fravashis, the forth-existing (hardly 'pre-existing') guardian spirits of the dead (cf. the pitaras and manes) or of invisible and immortal beings. The very attributes of God escape perhaps entirely their later inferior but still sublime dogmatic personification; their personification even when they are invoked may be a higher poetical personification leaving them still the characteristics and not merely the archangels of a Supreme Being. And he is not yet at all identified with 'light' as so often stated; nor did he 'create the world by his Word the Honover' (*Ahuna vairya*) which is a later prayer (*Yathâ ahû vairyô*) founded on a line of the Gâthas. Zoroaster his prophet did not laugh at his own birth (Pliny) nor 'withdraw from the world,' nor 'live on cheese for thirty years,' and out of the heap of this rubbish we must dig that remarkable religion which was not surpassed or equalled by any lore outside of the Semitic Scriptures. It is contained in seventeen precious fragments in Aryan metres like the Vedic Trishtup, Gâyatrî, and Âsurî, not more extensive than, say, thirty or forty average Vedic hymns. In these the supreme Deity Ahura Mazdâh, the Living God or 'Lord' (*ahu* = 'the living,' 'life,' or 'spirit,' root *ah* = 'to be'), the Great Creator (*mas* + *dâ* = Sansk. *mahâ* + *dhâ*), or 'the Wise One' (cf. *su-medhâs*), is represented as endowed with and acting through six attributes, *Vohu Manah*, his

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Good Mind (Benevolence; possibly 'his sagacity'), *Asha* (Vedic ṛita), his Order (the plan and symmetry of his works, an idea developed from the regularity of the seasons as the appointed times for prayer), his Sovereign Power *Khshathra*, his Perfect-mindedness *Aramaiti* (when dwelling in the pious worshipper it is 'complete readiness of mind,' 'devotion,' 'piety'), then his *Haurvatât*, welfare, wholeness, and its abiding character his Immortality, *Ameretatât*. These are practically the forms under which he shows himself as the Creator of heaven and earth and of all good things to his faithful worshipper the thrifty guardian of the herds, which as the source of honest livelihood had already become sacred, and were represented by the 'Mother Cow,' and by the 'Kine's Soul.'

The saintly citizen was also of necessity a tiller (*vâstriya*) of the not yet superstitiously sacred or worshipped earth, and an adherent to, or member of, the *Maga* (see below), the sacred Cause or Commonweal, more definitively expressed in the Holy Law the *Daêna*, the Insight (of conscience, &c.; cf. *dîn*, root *dî* = *dhî* = 'to see'), by which he exercised his obedience *Sraosha* (not yet the personified angel) in 'caring for the poor.' In which duty he was opposed by the non-agricultural (*avâstriya*) freebooting Daêva(Deva)-worshippers who were struggling with him for the control of the territory, aided by the Turanians on the north, only a handful of whom became the Friendlies (*Fryana*) by conversion. These enemies invaded his fields with murderous rapine (*Aêshma*), carrying on a warfare which was at once a scene of raid and battle embittered on the one side (that of the Daêva-worshippers) by the divergencies of religious belief. And this in the course of protracted experience brought out into sharper outlines the recognition of one dreadful and self-dependent spiritual power, *Añgra Mainyu*—the assaulting (?) spirit—who was alone responsible for those sufferings which made Iranian life a load, and who acted through his chief attribute the Plotting Lie (*Drukhs*, *Druj*), perhaps, but not certainly, already dogmatically personified. He also instigates the Assault of the Raid *Aêshma* (see above), being animated by his *Aka Manah* (or *Achishta Manah*, Evil or 'Worst' Mind, insanity), which corresponds antithetically to *Vohu Manah*, although no full six attributes symmetrically corresponding to those of Ahura appear in those portions of the Gâthas which have survived to us. The *moral idea* is analysed as to thought, word, and deed, and represented as actuating the holy people in their struggle against their powerful and dangerous assailants, little room being left (as in the later Avesta) for anathematising such corruptions as Pride, Scorn, Slander, Envy, the Harlot, the Sorceress. These were however doubtless quite as fully reprobated by the earliest saints. In the last 'turning of the world' the faithful Mazda-worshippers were (together with their less civilised opponents) to undergo a final ordeal. This the faithful successfully meet by passing, encouraged 'by their own conscience,' over the Chinvat, the Judge's (or the Assembler's?) Bridge. This extended toward the Home of Sublimity (or Song) Demâne Garô, which was a Heaven of good thoughts and words and deeds, the scene of God's manifestation as the rewarder. And to this they, the faithful, are welcomed by the souls that have gone before; and there they are to enjoy unending felicity. Whereas the wicked failing to pass the 'narrowed' Bridge (so in the later Zoroastrianism) and 'curst by their own consciences' (so literally) fall to the Abode of the Lie-Demon. There they are met by the souls of the already damned with poisoned food and vile reproaches, and enter a Hell of evil thoughts and words and deeds where they remain for ever.

Such is the Gâthic or original Zoroastrian religion. There is one allusion to the very ancient myth of Yima, Vedic *Yama*. The god Vayu may possibly be mentioned, but the word may be an exclamation. The Fire is already the symbol of holiness, and we have an allusion to an ordeal by means of it. (This later, and not in Gâthic times, degenerated into the full imposture of the Nirang-i-var, which consisted in pouring molten brass on the breast as a test of innocence.) Beyond these there is little trace of lower elements. 'The wail of the Herd's soul' is poetically represented as articulate, and Zarathushtra is figuratively said to question Ahura; but such features recur in all similar ancient as in modern compositions. The system, if not a pure Unitarianism, is certainly a pure Dualism.

The *later Avesta*, notwithstanding great difference in the character of its many component parts, may here be treated collectively. In it, while the sublimity maintains itself as throughout, the scene is changed, and the now established religion has paid for its success by the acceptation of doubtfully desirable additions. Ahura is still supreme, save in two foolish passages where he compliments inferior deified objects by joining in the sacrifice to them, which however is by the fact itself shown not to have involved what we call 'worship,' and the bathos is not so decided as in the case of the drunken Indra. God's attributes have become dogmatically personified Archangels with great loss of original meaning. Their names are then given as the Amesha Speñta (Amshaspends), Immortal Bounteous (or 'Holy'?) Ones. Vohu Manah (still later) becomes the representative of the good creation, Asha Vahishta of the fire, Khshathra-vairya of metals (from an accidental occurrence of words); Spenta Ar(a)maiti becomes the earth; Haurvatât represents the waters (merely accidentally, and hardly from the healthfulness of waters); Ameretatât represents plants. The Fravashis, the 'forth-existing Manes,' appear. The Fire receives sacrificial veneration, as do the sun, moon, stars, earth, verdure, waters, &c. Still later six seasons of creation are distinguished, and the five divisions of the day. Sraosha becomes a warrior angel, and the Gâthas are so ancient that their present number, 'five,' is recognised and mentioned as they are 'worshipped.' Zarathushtra loses all his human traits, and becomes a mythic demigod, conversing literally with Ahura. Laws are given through him, some of them wise and some of them excessively trivial. The Haoma-worship (see SOMA) begins, then Mithra and a throng of gods appear, and the Avesta becomes almost the Ṛik, and with more of its metres. The Vedic gods are often, but not always, turned into devils. *Vis à vis* to the Amesha Speñta (see above) appear correspondingly as *six demons* Aka Manah (the Evil Mind), Indra, Sauru (cf. Çarva, a name of Çiva), Nâonghaitya (Ved. Nâsatya), Tauru (cf. Sansk. *tura* = wound), and Zairika (cf. Sansk. *jaras* = decay), actually grouped, however, with their opposed divinities only in the greatly later Pahlavi Bundahish.

As to the *birthplace* of the Avesta, we must postulate several different regions for the different works. The privileges of the Zarathushtrian Ragha mentioned in the later Avesta have been supposed to confirm the claims of that province to be the cradle of Gâthic life; but they may have had little to do with it. Airyana Vaêja (the Aryan starting-place) is lost in prehistoric mists. In the Vendîdâd we have, although in less original forms, the well-known names of Sughdha (Samarkhand?), Môuru (Merv), Bâkhdhi (Baktra, Balkh), Harôyu (Harirud), Vehrkâna (Jorjan), Harahvaiti (Harût), Haêtamant (Helmend), Ragha (Rai), Hapta Hindu (Punjâb); and these according generally with the statements of the later Greeks lead us to look

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towards the east of Iran, where the Daêva-worshippers must have once lived before they became 'River-men' (Hindus) by descending into the Five Waters (Punjâb). Keresaspa, an early hero, is located at Kabul, and the name Jemshid still lingers in Eastern Iran. Later the lore may have travelled westward, for Atropatene became a centre; but a religion as like the Avesta as parts of the Avesta are like each other was at home in all Media and Persia under the Achemenids, Arsacids, and Sassanians up to the Arabic conquest in 650 A.D., and a fragment of its adherents still linger at Yezd and Kerman (see PARSEES).

The *age of the Avesta* is to be estimated from its oldest part, the historical, which under no circumstances can be put later than 700 or 800 B.C.—i.e. two or three centuries before the inscriptions of Persepolis and Behistun, *c.* 500. These mention the Magians, who, by several usages never Gâthic (especially by the exposure of the dead), are identified with the later Avesta, and several centuries are necessary to account for the change. The language of the inscriptions is also in an advanced stage of decay from the earlier inflections; and this, while not decisive, has much weight, for newer language is on the whole more natural to newer writings than older forms. History is on the side of a remoter antiquity, for some of the Greeks placed Zoroaster very long before their time. But the proper test is *criticism*, which places the Gâtha close beside the oldest hymns of the Rig Veda—say 1200 to 1500 B.C., Zoroaster being mythically associated with the ancient Yima (Sansk. *Yama*). But we may be led on to accept a still remoter antiquity for the Gâthas. The absence of Mithra, Agni, Indra, and even of Soma (Haoma) and the Pitaras (Fravashis), demands a new if alternative hypothesis, which is not that they were dropped gradually or suddenly (Haug), but that these deities were still unknown and therefore ante-dated (in Iran). And this would place the Gâthas so far back as to enable us to account for the name of *maga* (which is strictly Aryan), as carried down by Turanian Akkadians to Babylon, and also for the appearance of Zoroaster's name in those regions (cf. Polyhistor as cited by Professor Rawlinson, Sir H. Rawlinson having also conjectured a Semitic etymology for the word). The earlier part of the later Avesta should be placed at about 600 B.C. to account for the exposure of the dead, &c., mentioned by Herodotus as Magian, while its later (genuine) portions extend say to the 3d century B.C., and easily recognisable additions may be indefinitely later.

The *influence* of the Avesta, or of the ancient lore of which it is a fragment, was possibly felt first in Babylon (see above), but also extended later and adversely to hostile India, where its *dahyus* were reprobated as *dasyus* and its Ahura classed with the now later reprobated Asuras. But Mazdâh-worship, of which the Avesta was the chief exponent, extended over all Iran and Media, as well as Bactria. Afigra Mainyu his great adversary is as fiercely represented on the inscriptions of Darius as he is in large portions of the Vendîdâd, where Druj, his representative, defiles by impurity, as he does so often on the tablets by the Plotting Lie (Draogha). The actual name Añgra Mainyu does not appear either on the rocks mentioned or in the greater part of the Vendîdâd itself. Even Haurvatât and Amerestatât, the great Amshaspends, Weal and Immortality (two of the Seven), are totally absent from one entire third of the Avesta, and this renders the negative argument from the absence of the names from the Inscriptions worthless as proof against the recognised existence of either these Gods or of that Demon at the dates indicated. The Inscriptions are full of the spirit of the Avesta, which may possibly be named Âbasta (so Oppert); or they are full of a lore from which both sprang. If not the Avesta, then a closely related sister-lore influenced the 'Cyrus' of Isaiah, the 'seven spirits' of Zechariah (cf. also Rev.), the Pharisees who were the Farsees = Parsees, &c. The Avesta influenced the Gnostic philosophy in its sources—cf. the *δημιουργὸς εὐνοίας* = Volu Manah (Plutarch), *δημιουργὸς σοφίας* = Aramaiti (Strabo), the *δημιουργὸς πλούτου* = Haurvatât (Plutarch), and *Ἀ(μα)ρ[α]δατος*** = Ameretatât (Strabo). It influenced Jakob Boehme (born 1575), and through him Schelling, and even the modern antithetical *Dialektik* and dualism (see Zeller's *Geschichte der deutschen Philosophie*, pp. 14 and 687). For the traditional development among the Indians, see the article PARSEES.

Literature.—Spiegel's Yasna and Vendîdâd texts have also the Pahlavi translation. Geldner's objective edition gives an invaluable mass of variations. For the translations, see the *Sacred Books of the East*, by Darmesteter and the present writer (vols. iv. xxiii. and xxxi.); the latter's Gâthas, with literal and free translations, commentary, and the Zend, Pahlavi, Sanskrit, and Persian texts (Brockhaus, 1892); also Darmesteter's Yasna in French (1892).

Zengg (*Senj*), an Austrian port on the Croatian part of the Adriatic coast, 75 miles SE. of Trieste, with an old cathedral and some trade. Pop. 3039.

Zenith, a word, like *Nadir*, borrowed from the Arabic, is the name given to that point of the heavens which is exactly overhead—i.e. in line with the spectator's position and the centre of the earth. It is thus the upper pole of the spectator's horizon, as the nadir is the under pole.

Zenjan, a town of Persia, half-way between Tabriz and Teheran, with bazaars and some local and transit trade. Pop. 15,000.

Zeno, a Greek philosopher who flourished about 500 B.C. at Elea, a town of Lucania, in Italy. A favourite disciple of Parmenides, he came with him to Athens, and there the illustrious Pericles was one of his pupils. According to the account usually given, on his return to Elea he joined an unsuccessful conspiracy to deliver his native town from the tyrant Nearchus, and the severest tortures failed to make him betray his accomplices. To ensure his silence he is said even to have bit his tongue off and spat it in the tyrant's face. He held the usual doctrines of the Eleatic school respecting the unity and the immutability of all things, distrust in knowledge acquired through the senses, and reliance on pure reason. He did not deny that there were phenomena or appearances, but he maintained that these were not real existences, in anticipation of Bishop Berkeley. Of his famous four arguments against motion the best known is that of Achilles and the tortoise. But he is chiefly remarkable for having been the first to employ the style of argument known by the name of Dialectics, in which error is refuted, and truth sought to be established, by the *reductio ad absurdum*—a method so skilfully employed afterwards by Socrates and Plato. He devoted his great powers of argument to enforce the doctrines first broached by Xenophanes, and more systematically developed by Parmenides. His works were in prose, but only small fragments have been preserved. See Zeller's *Pre-Socratic Philosophy* (Eng. trans. 1881).

Zeno (342–270 B.C.), founder of the Stoic philosophy, a native of Citium in Cyprus. His father was a merchant, and it is said that some stray writings of the Socratic school he brought with him in his trading voyages made Zeno a philosopher. At two-

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and-twenty he came to Athens, attaching himself first to the Cynic Crates. But he soon became dissatisfied with the Cynics' conventional disregard for conventionality and indifference to speculative inquiry, and next joined the school of the Megaric Stilpo. Still unsatisfied he betook himself to Polemo the Academician; and having thus made himself master of the tenets of the various schools, he proceeded to open a school for himself in the 'Painted Porch' (*Stoa Poikilē*). Here he taught, honoured by all, until in extreme old age he voluntarily put an end to his life.

See STOICISM; also Zeller, *Stoics, Epicureans, and Sceptics* (Eng. trans. 1870); R. Hirzel, *Untersuchungen zu Cicero's phil. Schriften* (vol. ii. 1882); and A. C. Pearson's *Fragments of Zeno and Cleanthes* (Camb. 1891).

Zeno, EMPEROR. See BYZANTINE EMPIRE.

Zeno OF TARSUS, the successor of Chrysippus, leader of the Stoic school. He expressed himself doubtfully about the doctrine of the conflagration of the world.—ZENO OF SIDON, an Epicurean philosopher, pupil and successor of Apollodorus, taught with great success at Athens down to 78 B.C., and is warmly praised by Diogenes Laertius and Cicero. His fellow disciple and successor Phædrus was heard by Cicero at Rome as early as 90 B.C.

Zenobia, SEPTIMIA, queen of Palmyra, was a native of the city, of Arab descent probably, and became the wife of the Bedouin Septimius Odænathus, who in 264 A.D. was appointed by Gallienus governor of the East. From 266 she and her young son, Wahballath or Uaballathus, shared Odænathus' power, and on his murder (*c.* 271) nearly the whole of the eastern provinces submitted to her sway. When Aurelian assumed the purple, he marched against her with a large army, and, after defeating her in several battles, besieged her in Palmyra. Her hopes of being relieved by the Persians and Arabians being disappointed, she attempted to escape by flight, but was captured, 272. Before the conqueror her courage failed, and she saved her own life by imputing the blame of the war to her counsellors, especially her secretary, the celebrated Longinus (q.v.), who was accordingly beheaded. Zenobia was led in triumphal procession at Rome, decked with splendid jewels, and almost fainting under the weight of gold chains. She was presented by her conqueror with large possessions near Tivoli, where, in the society of her two sons, she passed the rest of her life in comfort and even splendour. She was a woman of great courage, high spirit, and strikingly beautiful. With purity of morals in private life she combined prudence, justice, and liberality in her administration. Her literary acquirements were considerable; she spoke Latin and Greek, as well as the oriental languages, with fluency. Pagan emblems on her coins disprove the notion that she was attached to the Jewish faith.

Zenta, a town of Hungary, on the Theiss, 33 miles S. of Szegedin by rail, with an active trade in cattle. Pop. 21,200. Here Prince Eugene defeated the Turks, September 11, 1696.

Zeolite (Gr. *zeō*, 'I boil'), the common name of a large group of minerals, often called the Zeolitic family. They receive this name from their melting and bubbling up before the blowpipe. They are all soluble in acids, and most of them gelatinise in acids in consequence of silica being set free. They are hydrated silicates of alkalies or alkaline earths, most of them containing alumina. Magnesia is rarely present in them. Their composition, however, is very various. They are generally found in amygdaloidal cavities, or in fissures of basalt, porphyrite, &c., and occasionally also in granite, gneiss, and other crystalline schists and altered rocks, apparently as deposits from water percolating through the rock. They sometimes, but rarely, occur in veins. They are found either in crystals or of crystalline structure, often in plates or fine scales, often in needles or fibrous. Among them are *Analcime, Natrolite* or *Mesotype, Scolezite, Thomsonite, Stilbite, Heulandite, Phillipsite, Gmelinite, Chabasite, Harmotome* or *Cross-stone, Apophyllite* and *Laumonite*. The number of species and varieties which have been described and have received dictinct names is very large.

Zephaniah (Heb. *Çephanyah*—i.e. 'whom Jehovah hides' or 'protects'), a Hebrew prophet who flourished under Josiah towards the end of the 7th century B.C. He is described in his book as a great-great-grandson of Hezekiah; probably the king of that name is intended. From his allusions to prevalent idolatry in Judah and Jerusalem it may be inferred that Zephaniah wrote previously to Josiah's great reform in 621 B.C., and that his prophetic work helped to promote that movement. His brief prophecy may be divided into three parts: i., ii. 1—iii. 7, and iii. 8-20. The first, which may be entitled the menace, is an announcement of wide-spread destruction imminent over man and beast, bird and fish, and in particular over Judah and Jerusalem, especially its corrupt court-officials, its merchants, and those who profess religious indifferentism. The 'day of Jehovah' (a day of battle, not of assize) is described in dark and gloomy colours. In the second part, or the admonition, Israel is exhorted to escape by timely repentance from the doom about to overtake the Philistines, Moab and Ammon, Ethiopia and Nineveh. Here the prophet seems to have in his mind the Scythian invasion with which Egypt was threatened in 626 B.C. The promise is contained in the third part. The faithful in Jerusalem are bidden wait patiently for the fulfilment of the divine judgments, after which all nations will serve Jehovah with one consent, and the purified remnant of Israel will rejoice in God's presence among them, and become 'a name and a praise among all the peoples of the earth.'

See the commentaries by Hitzig-Steiner (1881), Ewald (Eng. trans.), and Keil (2d ed. 1888); also Wellhausen's *Die Kleinen Propheten übersetzt mit Noten* (1892); and, for further references to the literature of the subject, Driver's *Introd. to Lit. of Old Testament* (3d ed. 1892).

Zerafshan. See BOKHARA.

Zerbst, a town in the duchy of Anhalt, capital of the former duchy of Anhalt-Zerbst, on a tributary of the Elbe, 26½ miles SE. of Magdeburg by rail. The church of St Nicholas is a beautiful specimen of Gothic architecture. Pop. 15,069.

Zermatt, an important centre for tourists in Switzerland, is a small village of (1888) 525 inhabitants, near the upper end of the Visp valley in Valais, 25 miles SSW. of Visp by the railway opened in 1891. It stands 5315 feet above the sea, having to the south the great Théodule glacier, above which towers the Breithorn on the east and beyond the Monte Rosa group, and on the west the rocky cone of the Matterhorn. The churchyard contains the graves of many of the victims of mountaineering. The Théodule Pass or Matterjoch (10,899 feet) leads to Aosta in Italy.

Zero (Fr. *zéro;* Ital. *zifro;* Arab. *sifr*, 'cipher'), the number 0 (see NUMERALS), and the point from which the reckoning begins on Scales (q.v.) such as those of the barometer, &c.

Zetland. See SHETLAND.

Zettinye. See CETINJE.

Zeuglodon (Gr., 'yoke-toothed'), a fossil whale-like mammal, so named by Owen from the yoke-like, double-rooted formation of its cheek

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teeth. The remains of the Zeuglodon were first found in Louisiana in 1839; an almost complete specimen, 70 feet long, was obtained in 1843 in Alabama. The creature had an elongated snout, and is regarded by Huxley as intermediate between true cetaceans and carnivorous seals. Its remains occur in the older tertiary deposits of England, Egypt, and North America.

Zeulenroda, a town of the German principality of Reuss-Greiz, 51 miles SSW. of Leipzig. Pop. 7970.

Zeus, the greatest of the national deities of Greece, was, according to the most received mythology, son of Cronos and Rhea. With the help of his brothers and sisters, Poseidon, Hades, Hestia, Hera, and Demeter, he overthrew Cronos and the Titans, assumed the sovereignty of the universe, and took as his peculiar province the heaven above, giving to Hades the infernal regions, to Poseidon the sea, the earth being left subject to the influence of all three, although to Zeus belonged the supremacy. Next him stood his sister and consort Hera, mother of Ares, Hephæstus, and Hebe. This was his rightful wife, but her position did not preclude a number of inferior marriages with other goddesses, and intrigues with mortal women, as Europa, Antiope, Callisto, Semele, Danae, Io, Leda, Alcmena, &c. Thus he swallowed his wife Metis to bring forth Athena from his own head; Themis bore him the Hours and the Fates; Eurynome, the Graces; Demeter, Persephone; Mnemosyne, the Muses; Maia, Hermes; Leto, Apollo and Artemis. Crete, Rhodes, Dodona, and Arcadia were the places where the worship of Zeus was most cultivated, but of all places Mount Olympus in Thessaly and Mount Ida in the Troad were his especial haunts. All the local cults of Zeus came gradually to be merged in one great Hellenic divinity—a process carried still further when Zeus was identified with the Jupiter of the Romans and the Ammon of Libya.

Besides the epithets of Zeus from the seats of his worship, he had many titles applied to him from his various powers and functions, moral and physical. He was the father and king of gods and men; the protector of kings, of law and order; the saviour and giver of victory; the avenger of broken oaths and of other offences; he watched over the state, the assembly, the family, over strangers and suppliants; his hand wielded the lightnings and guided the stars; he ordained the changes of the seasons, and, in short, regulated the whole course of nature. All prophecy, too, was supposed to originate in him, and it was from him that Phœbus Apollo received his oracular gift. He dispensed, as it pleased him, both weal and woe to mortals; but whether he could control the Fates themselves is a point about which the ancients disagreed, as men have done of the Supreme deity in all ages where the problems of free-will and fate cross each other. Of the many epithets applied to Zeus perhaps the best known is the 'Olympian,' from that Olympus in Thessaly whose summit was believed to be his residence as well as that of the other gods. His most celebrated festival was the Olympic, held at Olympia, in Elis, after the end of every fourth year.

These exalted conceptions of the majesty and power of Zeus harmonise indifferently with the stories of his amours with mortals and immortals, as well as with the motives of caprice, anger, deceit freely attributed to him. Solar mythologists have made bold to explain transformations into a bull and the like as originally a poetic and symbolical realisation of natural phenomena. But it may be gravely doubted if there is any foundation for these theories beyond the fact that the name (Sanskrit *Dyaus*) undoubtedly means *sky*. It is much more probable that Mr Lang's theory is true—that such a mythological growth as the traditional Zeus is a confusion of myths of perverted history, of primitive physical conceptions, and elementary pantheistic speculation, added to native myths descending from a totemistic stage of culture.

See MYTHOLOGY, ANIMALS (WORSHIP OF), BEAST-FABLES, and JUPITER; also Welcker's *Griechische Götterlehre;* Preller's *Griech. Mythologie;* and, for Zeus in art, Overbeck, *Griech. Kunstmythologie* (vol i. 1871).

Zeuss, JOHANN KASPAR, the founder of Celtic philology, was born at Vogtendorf near Kronach in Upper Franconia, 22d July 1806. He studied philology and history at Munich, became professor in the Lyceum at Bamberg in 1847, and died at his birthplace, November 10, 1856. His three chief works were *Die Deutschen und die Nachbarstamme* (1837), *Die Herkunft der Bayern von den Markomannen* (1839), and his great masterpiece of erudition and method—*Grammatica Celtica* (2 vols. 1853; 2d ed. by Ebel, 1868–71).

Zeuxippus, one of the eight successors of Ænesidemus in the leadership of the revival of Pyrrhonian Scepticism.

Zeuxis, the celebrated painter, was born at Heraclea, but whether that in Lucania or on the Euxine, is unknown. He is also styled of Ephesus, which means that he belonged to the Ionian school of painters. He flourished from *c.* 420 B.C. to near the end of the century, and was at Athens about the beginning of the Peloponnesian war. He excelled in the treatment of light and shade, in accuracy of imitation of natural objects, and in rendering types of sensuous beauty, especially of women. His most famous pictures were 'Zeus enthroned;' 'Helen,' his masterpiece, painted for the city of Croton; 'The Infant Hercules strangling the Serpents;' 'The Female Hippocentaur.' By the exercise of his art he attained to great riches and fame, and, like his rival Parrhasius, was exceedingly conscious of his pre-eminence. He repeatedly presented rather than sold pictures to cities that were anxious to possess them, because he thought no money-price could pay for them.

Zeyla. See SOMALI-LAND.

Zeyst, a large village in the Dutch province of Utrecht, with manufactures of soap, candles, porcelain-stoves, &c. Here settled in 1746 a still thriving society of Moravian Brethren. Pop. 6372.

Zhitomir, or JITOMIR, chief town of the Russian government of Volhynia, on an affluent of the Dnieper, 80 miles W. of Kieff. Pop. 56,782.

Zhob, a river of southern Afghanistan (or northern Beluchistan) which joins the Gomul north-west of the Suliman Mountains, and with it flows into the Indus near Dera Ismael Khan. There are valuable passes into Afghanistan both by the Gomul and the Zhob valleys—the latter of which was annexed by Britain in 1889 (see the map at AFGHANISTAN).

Zibet. See CIVET.

Zidon. See SIDON.

Ziegenbalg, BARTHOLOMEW, missionary, was born 14th June 1683 at Pulsnitz in Lusatia, studied at Halle, and on the call of Frederick IV. of Denmark went to establish Christian missions in the then Danish colony of Tranquebar, where he arrived in 1706, dying there in February 1719. He published a Tamil grammar and a Bible in Tamil.

Ziegler, HEINRICH, theologian, born at Posen, 16th May 1841, studied at Berlin and Jena, and at the Wittenberg *Seminarium*, lectured in gymnasia at Berlin, and in 1874 was nominated *Diakonus* in the St Peter-Paul church at Liegnitz, when the

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Consistory at Breslau opposed the nomination, which was, however, confirmed by the supreme Church Council, and in 1877 advanced to be Pastor Primarius of his church. Among his writings are *Die Lehre des Irenäus* (1868), *Irenäus der Bischof von Lyon* (1871), and *Die Gegenreformation in Schlesien* (1888). After Keim's decease he edited *Rom und das Christenthum* (1881). His five lectures, *Der Geschichtliche Christus* (1891), sorely exercised the Breslau Consistory.

Zierikzee, chief town of the Dutch island of Schouwen (q.v.); pop. 7043. It was taken by the Spaniards in 1576 after an obstinate defence.

Zieten (or ZIETHEN), HANS JOACHIM VON, Prussian cavalry general, was born at Wustrau in Ruppin, 14th (24th) May 1699, entered the service at fifteen, but retired in 1724, only to rejoin in 1726. A quarrel with his captain brought him a year's imprisonment and dismissal from the service, but in 1730 he was rehabilitated. As colonel of a regiment of hussars (1741) he did much to increase the efficiency of the Prussian light cavalry. In 1744 at the head of the advanced guard he burst into Bohemia, and then executed a dexterous retreat behind the Elbe, in the course of which he beat back an attack of 16,000 men at Moldau-Tein (12th October). He covered himself with glory at Hohenfriedeberg (4th June 1745), and, throughout the Seven Years' War, at Prague, Collin, Leuthen, and Liegnitz, where he was made general of cavalry on the battlefield (15th August 1760). The victory at Torgau (3d November 1760) was in great measure due to his dash and vigour. After the peace 'Old Father Zieten' lived out his days in retirement at Berlin, in especial favour with the king, and died 26th January 1786. See Life by Winter (2 vols. 1885).

Zillerthal, a Tyrolese valley watered by the Ziller, a tributary of the Inn, whose inhabitants are noted for their handsome figures and their admirable singing. In 1837, 400 of their number, feeling auricular confession a grievance and inclining to Protestantism, were compelled to leave their homes, ultimately settling at Erdmannsdorf near Liegnitz, in Prussian Silesia.

Zimb. See TSETSE.

Zimbabye, or GREAT ZIMBABWE, a notable ruin in Mashonaland, in 20° 16′ 30″ S. lat. and 31° 10′ 10″ E. long., and 3300 feet above sea-level. It is the principal of a series of similar remains along the west side of the Sabi River, and consists of a large elliptical building (280 feet long, with walls 35 feet high and 16 feet thick) on a gentle rise, with buildings extending into the valley, and an immensely strong labyrinthine fortress on the opposite hill, 400 feet above. The older buildings are beautiful examples of dry masonry. There are a considerable number of little images of the solar disc; whilst the two conical towers in the sacred enclosure on the lower hill, as well as the chevron ornamentation there, and various objects found in the citadel point to phallic forms of worship. The ruins evidently formed a garrison for the protection of a gold-producing race in remote antiquity, of whose work many traces have been found—a smelting-furnace made of hard cement, clay crucibles with little specks of gold adhering, an ingot mould of soapstone, burnishers, crushers, carved soapstone birds, &c. Mr Theodore Bent, who explored the ruins in 1891, assigns this enterprise to pre-Mohammedan Arabians (with possibly Phœnician influences), as both the objects of art and the special cult indicated are utterly foreign to the African races. K. Mauch would identify the region with the Ophir (q.v.) of Solomon's time. See Bent's *Ruined Cities of Mashonaland* (1892), and Mauch's *Reisen* (Gotha, 1877).

Zimisces. See BYZANTINE EMPIRE, p. 601.

Zimmermann, JOHANN GEORG, RITTER VON, philosophical writer, was born at Brugg in the canton of Aargau, 8th December 1728, studied medicine at Göttingen, and by his dissertation, *De Irritabilitate* (1751), laid the foundation of his fame. After a tour through Holland and France, he became town-physician at Brugg, and here he published his famous book *On Solitude*, a work of artificial melancholy and sentiment, which had a vogue now somewhat difficult to understand, and was translated into almost every European language (*Ueber die Einsamkeit*, 1755; entirely new ed. 4 vols. 1784–85). Other works were *Vom Nationalstolz* (1758), and *Von der Erfahrung in der Arzneikunst* (2 vols. 1764). From 1768 first body-physician to George III. of England and Hanover, he was summoned to Berlin to the last illness of Frederick the Great, and after the king's death published several vain and worthless books about him. He died 7th October 1795. See the book by Bodemann (Hanover, 1878).

Zinc (sym. Zn, eq. 65, sp. gr. 6·9 to 7·15) is for many purposes a valuable metal. Some coins struck by the Romans early in the Christian era are of brass (an alloy of copper and zinc), but as zinc was not then known as a separate metal, it is believed that this brass had been produced by adding to melted copper the mineral calamine, which we now know is a zinc ore. Paracelsus (q.v.) pointed out that zinc was a metal; but the exact nature of this metal and of its ores was not distinctly known till the 18th century. But zinc appears to have been used in China, and perhaps also in India, from an early period.

Zinc is a bluish-white metal, breaking with a crystalline fracture. When chemically pure it is malleable and ductile at ordinary temperatures, but all commercial zinc is somewhat brittle until it is raised to the temperature of 212° F. or preferably to 300° F. (149° C.), when it can be hammered, drawn, or bent. It is rather remarkable that it does not readily become again brittle when cooled, although workmen manipulating zinc out of doors in winter generally take the precaution to previously heat it over a fire. If zinc is raised to a temperature as high as 400° F. it becomes so brittle that it can easily be reduced to powder. The melting-point of this metal is 773° F. (412° C.), and its boiling-point is 1904° F. (1040° C.). It burns in the air at a high red heat with a bright, greenish-white flame, emitting dense white fumes. It is only slightly acted on by air and moisture, but when exposed to these it rapidly loses its bright metallic lustre, taking on a thin grayish film which protects the metal beneath from the further action of oxygen and carbonic acid. Pure zinc is only very slowly attacked by mineral acids, but all commercial kinds dissolve in them very readily with evolution of hydrogen. Ordinary zinc will also dissolve in a warm solution of potash or soda. A slight crackling sound is produced when the metal is bent after fusion, and even with sheet-zinc prepared for use this sound is sometimes detected by artisans shaping it, in which case they anneal the piece before sharply bending it. Zinc, though much harder than lead or tin, is softer than ordinary brass. It dirties, or at least changes in appearance, even indoors, sooner than most common metals, and it does not keep on a coat of paint so well as any of them.

Oxide of Zinc, ZnO.—When the finely-divided metal is held in the flame of a Bunsen burner it takes fire, giving off abundance of white fumes which are zinc-oxide. These fumes were called philosopher's wool by the alchemists. On a large

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scale oxide of zinc is manufactured by burning the vapour of the metal issuing from the necks of clay retorts in chambers through which an air current is passing. The vapour employed for the purpose is that produced from a retort charged with calcined ore and coke, and the oxide is deposited as a loose, white powder, forming the paint known as zinc-white. It has only about half the density of white lead and has much less 'body,' but it does not darken like the lead pigment (see WHITE PIGMENTS). This substance is also used as an ingredient in pottery colours. Oxide of zinc is readily soluble in acids, forming colourless salts. Heated in a flame it shows a yellow colour which turns white on cooling—a characteristic test for the metal. *Zinc hydroxide*, $Zn(HO)_2$, is thrown down as a bulky white precipitate from solutions of zinc salts by potash or soda, avoiding excess of alkali. It dries to a white powder.

Zinc Sulphate, $ZnSO_4,7H_2O$.—This salt, which, as shown by the formula, crystallises with seven atoms of water, used to be known as white vitriol. It crystallises in four-sided rhombic prisms isomorphous with Epsom salts, and, as sold, has usually the same appearance. It dissolves readily in water, and has a nauseous metallic taste. Sulphate of zinc is obtained when hydrogen is prepared by the action of sulphuric acid on zinc, but is made in larger quantities by roasting the native sulphide of zinc (blende) at a low red heat in the air until the necessary oxygen is absorbed. The product is thrown into water while hot, giving a solution from which the crystals are deposited. Sulphate of zinc so obtained is purified from arsenic and some other metals by treating its acidified solution with sulphuretted hydrogen. Iron and manganese have to be separated from the filtered solution by sodium hypochlorite. The salt is used in calico-printing, in making varnishes, and in medicine.

Zinc Carbonate, $ZnCO_3$, is one of the chief ores of the metal. The artificial basic carbonates are produced by precipitation from the solution of a zinc salt with an alkaline carbonate. When a boiling solution of sodium carbonate has the purified solution of zinc sulphate slowly added to it, a basic carbonate of zinc separates, which is then washed and dried. This gives the pure oxide on being heated.

Zinc Chloride, $ZnCl_2$, formerly known as *Butter of Zinc*, is formed by heating the metal in chlorine gas. But it is usually obtained by dissolving zinc or its oxide in hydrochloric acid, and evaporating the solution to dryness, fusing the residue, and casting it into cakes. When thus prepared it contains some oxychloride. It is grayish white, waxy, and extremely hygroscopic. It is very soluble in water, for which it has a great affinity, and is used as a caustic. Chloride of zinc deprives some organic bodies of water, producing decomposition. It is disinfectant and antiseptic.

ORES.—Blende and Calamine are the two principal ores of zinc. Those of minor importance are Zincite, Franklinite (q.v.), and Electric Calamine.

Blende, Sphalerite, Black Jack, or Sulphide of Zinc, contains when pure 67 per cent. of zinc and 33 of sulphur, but like most ores it usually contains impurities. It crystallises in the tetrahedron section of the cubic system. The crystals are generally of a beautiful black colour, and present considerable variety in their forms. Blende occurs in all the older geological formations sometimes associated with the ores of copper and tin, but most frequently with galena or sulphide of lead. In the United Kingdom blende is now chiefly mined in Wales, the Isle of Man, and Cumberland. It also occurs with galena at Leadhills in Scotland. On the Continent it is found plentifully in many localities, and abundantly in America with lead ore in Missouri, Wisconsin, Iowa, and Illinois. Blende is associated with other minerals in many places in Australia, but has not yet been found in large quantity.

Calamine, or Carbonate of Zinc.—By some mineralogists this mineral is called *Smithsonite*, a name more usually given to the silicate of zinc. It crystallises in the rhombohedral system, and contains when pure 52 per cent. of zinc. Calamine is generally found in calcareous rocks, and is usually of a dull yellow or reddish-brown colour in the ordinary massive state. Owing to impurities of earthy matters and oxide of iron, its percentage of zinc is sometimes as low as from 15 to 20. Calamine and blende are frequently associated. The metal obtained from the latter is generally somewhat inferior. Carbonate of zinc occurs in Belgium, in Silesia, at Santander in Spain, and elsewhere; but little is now raised in England. In the United States it is plentiful at Lancaster, Pennsylvania, and also occurs in south-west Missouri, Minnesota, Wisconsin, and in Arkansas, where in Marian county a variety is found coloured bright yellow by sulphide of cadmium, and known locally as 'turkey-fat ore.'

Electric Calamine, Silicate of Zinc.—The composition of this mineral when pure is zinc-oxide 67·5 (zinc 54), silica 25·0, water 7·5. It crystallises in the orthorhombic system, and its crystals are strongly pyro-electric. Its colour, always delicate, has many shades, such as white, blue, green, brown, yellow, red, and gray. Electric calamine is found along with other zinc or lead minerals in Carinthia, Westphalia, near Aix-la-Chapelle, and sparingly at Matlock and elsewhere in England. It is worked at one or two places in the United States, notably near Selinsgrove on the Susquehanna, and in Wythe county, Virginia. Silicate of zinc is now more easily smelted than formerly through the introduction of Siemens' gas-furnace.

Zincite, or Red Oxide of Zinc, is a mineral usually found massive with either a lamellar or a granular texture. Its crystals are hexagonal, but they are rarely found, and its colour is either red or orange. It contains about 94 per cent. of oxide of zinc and 6 of protoxide of manganese. It is found associated with Franklinite in New Jersey.

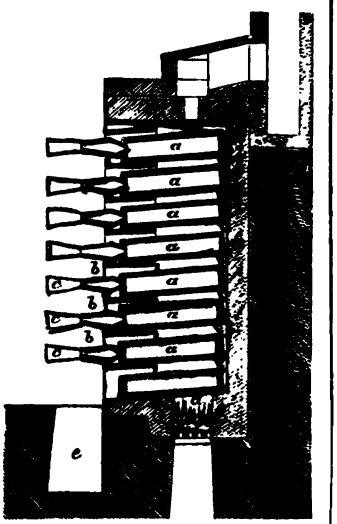

Fig. 1.—Vertical Section of a Belgian Furnace.

SMELTING.—The temperature at which roasted zinc ore (either carbonate or blende) is reduced is nearly the same as that which volatilises the metal, so that it requires to be smelted in closed retorts or muffles. There were formerly three kinds of closed-vessel furnaces in use for reducing the ore—the English, the Belgian, and the Silesian, but the first of these is little if at all employed. The furnace employed in the *Belgian Process* is an arched chamber, or recess, open in front. It is built of brick, and is shown in cross section in fig. 1. The retorts *a*, *a*, *a*, which fill the chamber, and into which the charge of ore

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in internal diameter. In an ordinary sized furnace, four of which are built in one stack or group, the chamber contains forty-six retorts arranged in eight parallel rows, but some have about double this number. These are supported at back and front in such a way as to allow the heat from the fire to play freely round them. Each retort has in front a bellied fireclay nozzle or adapter (*b*), on which fits a sheet-iron cone or receiver (*c*) having a small opening at the end. The fireplace (*d*) stretches across the width of the furnace under the lowest row of retorts, and the spaces between the retorts at the front are filled up with fireclay.

Each retort is charged with 13 lb. of roasted blende and an equal weight of non-caking coal, both powdered and intimately mixed. When the temperature of the furnace becomes high enough the blue flame of carbonic oxide appears at the end of the clay adapter, but by-and-by when zinc vapour begins to escape the flame becomes opaque and white in colour. As soon as this is noticed the sheet-iron cone is put on, in which zinc oxide collects. In a couple of hours, or it may be considerably longer, the bellied portion of the adapter, in which the zinc vapour condenses, contains a sufficient quantity of zinc to be removed. The oxide of zinc and zinc dust which accumulate in the iron receiver are also removed, and either added to the next charge or turned to some other use. The operation of emptying the adapter and receiver is

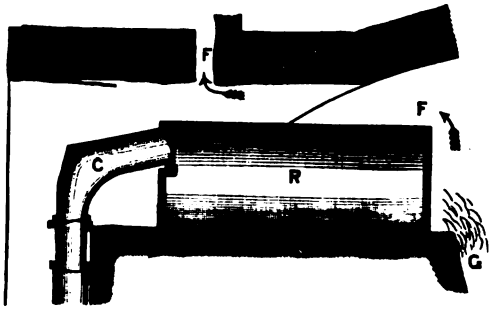

Fig. 2.—Longitudinal Section of a Retort or Muffle (R) of a Silesian Furnace: C, condensing portion; G, fireplace; F, flue, which also passes along the sides.

repeated at intervals till in about twelve hours the distillation is complete—i.e. till all the ore supplied at one time to the retorts of a single furnace is reduced. The zinc collected from the adapters is cast into oblong plates weighing fully ½ cwt., and known commercially as spelter. It is necessary before again charging the retorts to take off the adapters and scrape out the residue as well as any adhering slaggy matter, for the reception of which the pit *e* is provided.

In the *Silesian Process* larger fireclay retorts (muffles) are used than in the Belgian. They are differently arranged in the furnace, and are shaped like an oblong chest with a semicircular top (fig. 2). Each retort is internally 3 or 4 feet long, about 18 inches high, and 8 inches wide. An elbow-shaped nozzle is attached at the top of one end, and from this a pipe descends into a suitable receptacle. As the distillation goes on the zinc vapour passes over, and, when it condenses, falls into this receptacle in the form of drops of metallic zinc. Sometimes a nozzle like that for the Belgian retorts is used. The retorts, from ten to twenty or more in number, are all on one level in a low arched chamber of a rectangular shape. They are

retorts the amount of powdered coal or other fuel mixed with the ore varies from 25 to 50 per cent. It is greater for such zinc minerals as are difficult to reduce, or are easily fusible, than for other ores. A charge is worked off in twenty-four hours, the distillation commencing in six hours or rather more. In Silesia the calamine smelted does not contain on an average more than 15 per cent. of metallic zinc; 40 per cent. is the yield of a rich calamine carefully dressed.

The Belgian furnace takes up less room and consumes about one-fourth less fuel than the Silesian.

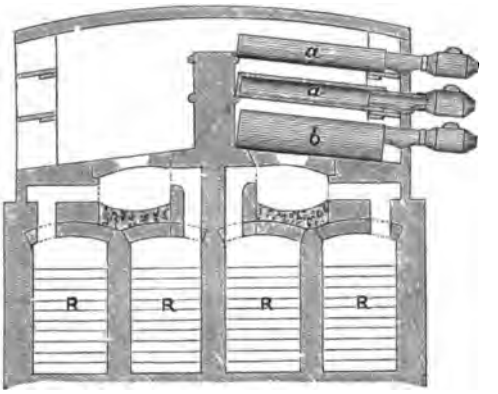

Fig. 3.—Siemens' Furnace adapted to the smelting of Zinc: *a*, *a*, Belgian retorts; *b*, Silesian retort; R, regenerators (see art. GLASS, p. 240).

On the other hand, there is greater expense for retorts in the former owing to their being more fully exposed to the heat of the fire. Fig. 3 shows a Siemens' furnace adapted to smelting zinc with both Belgian and Silesian retorts. In smelting zinc there is a loss of from 15 to 24 per cent. of the metal in the ore with English blende, and the amount of this loss is also considerable in the case of foreign ores. Zinc is obtained in an almost pure state by redistillation in clay retorts, if the first portion which comes over is rejected. But if required quite pure the oxide purified as above described under *zinc carbonate* must be reduced by pure carbon, such as charcoal from sugar.

Until it became known early in the 19th century that raising zinc to the temperature of 300° F. or somewhat less rendered it fit to be worked by machine tools the metal was used for little else than to make Brass (q.v.). It is still very largely employed to produce this and other alloys, but zinc itself is now extensively manufactured into many different kinds of objects. Among these may be mentioned sheets and other forms for roofing purposes, baths, plates for engraving upon, light screens with open patterns, and numerous kinds of stamped ornaments and articles of utility. In Paris and elsewhere it is largely used for the cheaper kinds of 'bronze' statuettes and like decorative objects, as it can be easily darkened to imitate bronze (see BRONZING). One of the most important applications of zinc is in galvanising iron to protect it from rusting, especially in such cases as roofing sheets, water vessels, and telegraph wires. Zinc has not a good reputation as a structural material other than for covering purposes.

The average annual produce of the zinc-mines of the United Kingdom during the five years ending 1891 was about 23,000 tons of ore (value £100,000), yielding nearly 9000 tons of metallic zinc, the value of which had risen from £16 to £24 per ton. The

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half of this total was obtained from Welsh mines, the blende of Cornwall being apparently for the present exhausted. The average yearly imports of zinc (76,000 tons) and of zinc ore (28,000 tons) for the same period had a value of £1,700,000.

In the United States, where the production of zinc has of late been rapidly increasing, the yield in 1889 was 58,860 (value £1,158,365) and in 1890 63,683 short tons (value £1,253,281); and this was mostly smelted in the states of Illinois, Kansas, and Missouri. Taking the yield of all countries into account, the total amount of zinc produced has for some years been gradually decreasing.

Zincali. See GYPSIES.

Zincography. See ILLUSTRATION.

Zingel (*Aspro zingel*), a fish of the perch family, found in the Danube.

Zingerle, IGNAZ VINCENZ, poet and scholar, was born at Meran, 6th June 1825, began philosophical studies at Trent, was a short time inmate of a Benedictine monastery at Marienberg, became professor in 1848 at the Gymnasium in Innsbruck, and in 1859 of German Language and Literature at the university there. Besides his volumes of poems he has published much on ethnography, and literary and historical matters. Many of his books are devoted to the Tyrol, its myths, folk-tales, family and Christian names, customs, &c.

Zingiberaceæ, a natural order of about 470 species of perennial tropical herbs, with horizontal thickened root-stock and cone-like inflorescence, with three tribes, of which *Zingiber* (see GINGER), *Maranta* (see ARROWROOT), and *Canna* (see INDIAN SHOT) are types. The Marantaceæ were formerly treated as a separate order; and Scitamineæ included Zingiberaceæ and Musaceæ.

Zinzendorf, NICOLAUS LUDWIG, COUNT VON, the founder of the Moravian Brethren, or Herrnhuters, was born at Dresden, 26th May 1700, and died at Herrnhut, 9th May 1760. He wrote sermons, hymnals, catechisms, and a number of controversial and devotional works.

See the article MORAVIANS; also the German Lives by Spangenberg (1773–75), Schrautenbach (1851), Verbeek (1845), Varnhagen von Ense in his *Biographische Denkmale;* Tholuck in *Vermischte Schriften;* also Bovet, *Le Comte de Zinzendorf* (1860; trans. as *The Banished Count*, 1865), and Burkhardt (1876).

Zion. See JERUSALEM.

Zirconium (sym. Zr, equiv. 90) is the metallic constituent of the earth *zirconia*, which is found in association with silica in the minerals *zircon* and *hyacinth*, and is obtained only in Ceylon, one district of the Ural, and southern Norway. Berzelius obtained it in 1824 from Zirconia, which Klaproth had discovered in 1789.

Zirknitz, LAKE (Slovenic *Cirknica*), in Carniola, is 20 miles SW. of Laibach and 1860 feet above sea-level. Its area and depth depend much on the rainfall; the tunnels and cavities in the limestone mountains around either adding to it or carrying off its waters according to the weather. It is sometimes 5 miles long, with an average depth of 18 feet; but in some years its whole area is dried up. Hence the saying that according to season one may fish, hunt, or harvest in or on it.

Ziska, or ZIZKA, JOHN, the famous leader of the Hussites, was born of noble family at Trocznov, in Bohemia, about 1360. Brought up as page to King Wenceslas, he embraced the career of arms, and it was his desperate courage at the head of his Bohemian and Moravian contingent that decided the dreadful battle of Tannenberg (15th July 1410), in which the Grand-master and 40,000 Teutonic Knights were left dead on the field. Ziska next fought with the Austrians against the Turks, and distinguished himself at Agincourt (1415) against the French. Returning to Bohemia soon after the murder of John Huss (q.v.), he became chamberlain to King Wenceslas, and joined the extremest party of hatred against Rome. After the outbreak at Prague (30th July 1419) Ziska was unanimously chosen leader of the popular party, and the first great religious conflict of Germany began. Wenceslas dying, his brother, the faithless Emperor Sigismund, sent 40,000 men into the country to obtain the throne, but the Hussites defeated his army with a hastily levied force of but 4000 men. Ziska quickly completed his conquest of Bohemia by capturing the castle of Prague (1421), and secured his hold of the country by the erection of fortresses, chief of which was that of Tabor, whence his party derived its name of *Taborites*. Ziska armed his followers with small firearms then little used, and made up for his lack of cavalry by the protection of the *Wagenburg*, or 'cart-fort,' constructed of the baggage-wagons. In 1421 he lost his remaining eye at the siege of the castle of Raby, but though now totally blind he continued to lead on his troops to a succession of twelve victories almost unexampled in history. Indeed his one defeat (Kremsier in Moravia) was almost a drawn battle. The victory of 18th January 1422, when Sigismund's second invading army was driven in headlong rout into Moravia, and 2000 drowned in attempting to escape across the frozen Iglau, was his greatest battle; and next year at Aussig he overthrew the German army, commanded by Frederick the Warlike of Saxony and the Elector of Brandenburg. Sigismund, now convinced that to conquer Bohemia was impossible, offered the Hussites full religious liberty. But the war-worn old soldier did not live long enough to complete the treaty, for at the siege of Przibislav he was seized with the plague, and carried off, 12th October 1424. He was buried in a church at Czaslav, and his iron war-club was hung up over his tomb. An apocryphal but characteristic story was long told that by Ziska's express command his skin was tanned and made into a cover for a drum, that even when dead he might be a terror to his enemies. Ziska was cruel, but less so than his enemies. See HUSS; also the study by Tomek (in German, Pragne, 1882).

Zither, the cithern, the modern representative of the ancient *cithara*, is a popular and common instrument in Tyrol, and of late years has become more widely known. It is a flat stringed instrument, having a wooden frame and flat sounding-board with from twenty-nine to forty-two strings. When to be used it is placed on a table or on the knees, and the strings are played by the right hand,. the thumb being armed with a metallic *plectrum* to bring out the melody more prominently. Its tone is clear, keen, and melodious.

Zittau, a town of Saxony, on the Mandau, near its junction with the Neisse, is an important railway centre, 21 miles SSE. of Libau and 21 SSW. of Görlitz. The chief buildings are the church of St John and the Byzantine Rathhaus. Zittau stands in the centre of a district rich in lignite, and in its neighbourhood are a group of busy manufacturing villages. It is also the centre of the linen and damask industry of Saxony, and has manufactures of woollens, besides bleachfields, dye-works, and iron-foundries. Pop. (1890) 25,394.

Zizel, or SUSLIK (*Spermophilus citillus*), a European ground squirrel, type of a genus mainly American. See SQUIRREL, CHIPMUNK.

Zlatoust, a town of Russia, on the navigable Ai, 198 miles NE. of Ufa by the great Siberian railway (1890). It has iron-foundries, and manufactures small-arms; pop. 19,014.

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Zmeinogorsk, a town of Siberia, 350 miles SW. of Tomsk. In the neighbourhood is one of the most productive silver-mines in Siberia. Pop. 6000.

Znaim, a town of Moravia, on the Thaya, 63 miles by rail N. by W. of Vienna, with earthenware manufactures. Here Marmont and Masséna defeated the rear-guard of the Archduke Charles, 11th July 1809. Pop. 12,254.

Zoæa. See CRUSTACEA.

Zoan. See TANIS.

Zoantharia. See ACTINOZOA.

Zoar, a village of Ohio, on the Tuscarawas River and Ohio Canal, 91 miles by rail S. of Cleveland, the seat of a German socialistic community. Pop. about 300.

Zöckler, OTTO, theologian, was born at Grünberg in Hesse, May 27, 1833, studied at Giessen, Erlangen, and Berlin (1851–56), became *privatdocent* at Giessen in 1857, and professor extraordinary in 1863, and obeyed a call in 1866 to Greifswald. He edited the *Evangelische Kirchenzeitung* (from 1882) and other religious serials.

Among his books are a history of asceticism (1863), *Die Evangelienkritik und das Lebensbild Christi* (1865), several sections of Lange's *Bibelwerk* (1866–72), *Das Kreuz Christi* (1875; Eng. trans. 1877), *Theologie und Naturwissenschaft* (2 vols. 1877–79), and *Gottes Zeugen im Reiche der Natur* (2 vols. 1881; Eng. trans. 1886). He edited, and partly wrote, the well-known *Handbuch der theologischen Wissenschaften in encyklopädischer Darstellung* (3 vols. 1883–84; 3d ed. 4 vols. 1889–90), and, together with Strack, a *Kurzgefasster Kommentar* to Old and New Testaments and the Apocrypha (1886 *et seq.*).

Zodiac (Gr. *zodiakos*, commonly derived from *zoön*, 'an animal'), the name given by the ancients to an imaginary band extending round the celestial sphere, having as its mesial line the ecliptic or apparent path of the sun. It was fixed at about 16° in width, for the purpose of comprehending the paths of the sun and of the five planets (Mercury, Venus, Mars, Jupiter, and Saturn) which were then known; and as of these planets Mercury has by far the greatest inclination of orbit to the ecliptic, and the value of that element in his case is only 7° 0′ 9″, the width given to the zodiac was amply sufficient for the required purpose. But when the career of planetary discovery commenced in the beginning of the 19th century the first three which were discovered (Ceres, Pallas, and Juno) at once destroyed the idea which had been long seated in men's minds, that no planets existed beyond the limits of the zodiac, by exhibiting orbits inclined to the ecliptic at no less angles than 10° 36¼′, 34° 42½′, and 13° 3½′; and a large number since observed have been found to wander from 0° to 18° beyond the zodiac, from which circumstance they have, along with the three above mentioned, been denominated *ultra-zodiacal* planets. The stars in the zodiac were grouped into twelve constellations, to each of which 30° or $\frac{1}{12}$th of the whole circle was assigned, though it often did not fill up that space, but was only situated in it; and this equable division into *signs* was of great advantage in defining the positions of the sun and planets at any epoch.

The constellations, with the appropriate symbols of the corresponding signs, are as follows: Aries (*Ram*) ♈; Taurus (*Bull*) ♉; Gemini (*Twins*) ♊; Cancer (*Crab*) ♋; Leo (*Lion*) ♌; Virgo (*Virgin*) ♍; Libra (*Balance*) ♎; Scorpio (*Scorpion*) ♏; Sagittarius (*Archer*) ♐; Capricornus (*Goat*) ♑; Aquarius (*Water-bearer*) ♒; Pisces (*Fishes*) ♓. As one half of the ecliptic is to the north, and the other to the south of the equator, the line of intersection of their planes is a diameter of each, and the two points in which this line meets the celestial sphere are known as the equinoctial points. The comparative immobility, with respect to the ecliptic, of these points suggested at once the employment of one or other of them as a point from which to reckon, and accordingly that point at which the sun crosses the equinoctial from south to north was fixed upon, and called the first point (or commencement) of Aries. After the sun had advanced eastward through this sign—i.e. 30° along the ecliptic—he entered the sign of Taurus, continuing his course onward through the others in the order in which they are given above, again crossing the equinoctial southwards at the point where he emerged from Virgo and entered Libra. This was the case with the sun during the time of Hipparchus (q.v.); but though the equinoctial points move very slowly, yet they do so continuously, and the westerly motion of 50″ annually which they have along the ecliptic has at the present time separated the sign Aries from the constellation Aries, and caused the former to correspond almost to the constellation Pisces. This gradual retrogression of the signs through the constellations of the zodiac will continue till they accomplish, in about 25,868 years, a complete circuit; after which period the sign and constellation of Aries will coincide, as they did in the time of Hipparchus. Neither the zodiac nor its constellations are of much use now in astronomy, except as, like the other constellations, affording an easy though somewhat fantastic nomenclature for the stars, and a rude but sometimes convenient mode of reference to their positions.

Zodiacal Light is the name given to a singular appearance seen after sunset or before sunrise, at all seasons of the year in low latitudes, but rarely in Great Britain except in March, April, and May in the evenings, and six months later in the mornings. It is obviously due to illuminated (partly, perhaps, self-luminous) matter surrounding the sun in a very flat lenticular form, nearly coinciding with the plane of the sun's equator, and extending to a distance from the sun greater than that of the earth, since its apex is often seen more than 90° from the sun. It seems to have been first distinctly pointed out by Cassini, and was long regarded as the sun's *atmosphere*. But this idea is totally irreconcilable with mechanical principles; since to assume so flat a form, in spite of the enormous attraction of the sun, and its own elasticity, an atmosphere would have to revolve with a velocity so great as to dissipate it into space. The common explanation of the phenomenon is that it consists (like the rings of Saturn) of an immense assemblage of small cosmical masses, such as are continually encountering the earth in the form of aerolites or meteorites. For the dynamical stability of such a system it is only necessary that each fragment should separately describe its elliptic orbit about the sun. The mutual perturbations of the system, on account of the enormous mass of the sun, will be exceedingly small, except in the case of actual collision; but some of the planets will have a considerable effect upon it.

Zoega, JOHANN GEORGE, archæologist and Coptic scholar, was born in Jutland, 20th December 1755, studied at Göttingen, and finally settled at Rome, where he turned Catholic. He wrote on Egyptian coins and Roman bas-reliefs, and made a great catalogue of Coptic MSS. He died February 10, 1809. See Life by Welcker (1819).

Zoepffel, RICHARD OTTO, a theologian of the school of Ritschl, was born at Arensburg in Livonia, June 14, 1843, taught theology at Göttingen, but settled in 1872 at Strasburg, where he became ordinary professor in 1877, and died 7th January 1891. His books are *Die Papstwahlen* (1871) and *Johannes Sturm* (1887). In conjunction

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with Holtzmann he edited the *Lexikon für Theologie und Kirchenwesen* (1882; 2d ed. 1888–91).

Zoetrope (Gr. *zōē*, 'life,' and *tropos*, 'a turning'), a scientific toy by which several pictures of objects or persons in various positions are combined into one visual impression, so as to give the appearance of movement or life. It consists of a hollow cylinder, closed at the lower end, supported on a vertical axis in the centre of that end. Round the interior of the cylinder, in its lower part, is a band of pictures of the same object, but varied in succession according to the varied steps of the movement intended to be shown. Round the upper part is a series of narrow slits, equal in number and opposite to the pictures. On revolving the cylinder rapidly and looking through these slits as they pass the eye, the figures of the picture appear as one moving figure. Each picture impresses the eye but for a moment, and is blended with the real picture by the continuance of the retinal sensation in the eye. Thus all become apparently successive positions of the *same* figure, instead of separate figures. The Thaumatrope and Praxinoscope are variations.

Zoffany, JOHANN, R.A. (1735–1810), a German portrait-painter settled in London.

Zohar. See CABBALA.

Zohrab. See FIRDAUSÍ.

Zoilus, a Greek rhetorician, who flourished in the 3d century B.C., and was born at Amphipolis. From the bitterness with which he attacked Homer he was surnamed *Homeromastix* ('Homer's Scourge'), and has bequeathed his name proverbially for a malignant critic.

Zola, a town on the upper Benue (q.v.), near the eastern frontier of the (British) Royal Niger Company's territories.

Zola, ÉMILE, the most celebrated, if not the best, French novelist of the last quarter of the 19th century, is not a Frenchman by extraction, his father having been an Italian engineer, who, however, executed works in France. The son was born in Paris on 2d April 1840, but passed most of his early life in Provence, returning to the capital for his school education. His father had died when he was a small boy, and when he left school he entered the publishing house of Hachette as a clerk. He became an active journalist pretty early, and engaged not merely in fiction, but in criticism both of art and literature. Here he was almost uniformly unfortunate—indeed the rather silly title, *Mes Haines*, under which his chief critical articles have been reprinted, shows his weakness; for you do not become or continue a critic by hating, but by loving. Like other journalists, he had to deal with politics, and was not much more fortunate here; while later he attempted the drama with equal lack of success. The truth is that M. Zola, for good or for ill, was a novelist born: and after early beginning his immense work in this department he by degrees confined himself to it. It is not a little noteworthy that among his earliest work figure the charming *Contes à Ninon*, collected and published when he was four-and-twenty, which have none of the faults of his later and larger works, and have sometimes been thought, not always by the least competent critics, to show him at his very best. This faculty for short stories showed itself again and again in *Nouveaux Contes à Ninon*, published ten years later (1874), in the still more recent collections, entitled from their chief tales *Le Capitaine Burle* and *Naïs Micoulin*, and most of all in the splendid *Attaque du Moulin*, the first piece of a collection of stories by himself and his chief disciples entitled *Les Soirées de Médan* (M. Zola's country house), and published in the year 1880. Long before this latter date, however, the author had become one of the most prominent and contested figures in the French literature of his day. In the later years of the empire he had formed with Flaubert, Daudet, the Goncourts, and the Russian novelist Turgenief a sort of informal society, which discussed all things literary, and which tended in the persons of its younger members to form what is called the Naturalist school—a name, of which, in contradistinction to 'Realist,' M. Zola claims the copyright. Among other works he published in 1867 a book, *Thérèse Raquin*, in which again others have seen his greatest work, and which certainly is a very powerful and remarkable picture of the effects of remorse.

But it was not until after the war that, in imitation to a certain extent of Balzac, he began the great series of novels generally called *Les Rougon-Macquart*. It is seldom that two years have passed without an addition to this series, which now contains, with branches and complements, a score or so of volumes, not proceeding in strict chronological order, but all connected by the appearance, more or less, of the same or different members of the family. This singular collection of books is, in the strictest sense, a collection of novels with a purpose—or with several purposes. It is a curious fact that the southern nations, which have originated few of the scientific or philosophical ideas of these later ages, have seized hold of them with a rather undisciplined avidity. The two 'mother-ideas' of M. Zola's *Comédie Naturaliste*, or as some would unkindly say, 'Comédie Bestiale,' have been the idea of heredity and the idea of a certain cerebral infirmity, which determines in different ways the fate of individuals. But in working this theory into practice M. Zola has imported a notable difference. It has been his intention to apply it in the widest manner to the study of the *document humain*—the records real or supposed of actual lives—and in order to do this he has taken the most extraordinary pains to master the technical details of most professions, occupations, and crafts, together with the history of recent and actual events in France. He began with a sort of general sketch and introduction called *La Fortune des Rougon*, and then he diverged into specialist paths. *La Curée* and *Son Excellence Eugène Rougon* dealt, or were supposed by the author to deal, with the society and official life of the later days of the Second Empire. *La Faute de l'Abbé Mouret* attacked the life of the country clergy and the results of celibacy, and, like *La Conquête de Plassans*, a vivid study of provincial life, has some special admirers. *Le Ventre de Paris* busied itself with the lowest, or almost the lowest, strata of the Parisian population, the life-history of the *halles* or markets—a theme which was later and somewhat differently treated in the most famous of the author's earlier works, *L'Assommoir*, a book specially depicting the vice of drunkenness; in *Pot-Bouille*, which dealt with the lower *bourgeoisie* and their servants; in *Au Bonheur des Dames*, which handled shops. *Une Page d'Amour* (much affected by some) and *La Joie de Vivre* (not successful as a whole, but very powerful in parts) were more generally and ambitiously human. *Nana*, the 'success of scandal' of the whole, was devoted exclusively to the cult of that great goddess, Lubricity, of whom we have all heard, and who certainly has her followers in France and elsewhere. *L'Œuvre*, the opening of which, at least, obtained praise from critics not very fond of him, dealt with art and literature. *La Terre* (the beastliest of the whole, unless that proud pre-eminence be allotted to *Germinal*, which dealt with mining) was conse-

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crated to the French peasant. *La Bête Humaine* contains more minute information as to the working of railways than anybody save a traffic superintendent can be supposed to be in a position to criticise; *Le Rêve*, sometimes thought to be a bid for the Academy (which goal M. Zola, unlike his friends M. Daudet and M. de Goncourt, has always sought), displayed a remarkable acquaintance with the details of church ritual and an attempt to be *honnête; L'Argent* exploited financial crashes; and *La Débâcle*, the most widely read and most debated of all, grappled with the great disaster of 1870, and endeavoured to show its causes. *Dr Pascal* (1893) is 'a story of the emotions.'

No space at command here would suffice to criticise these books in detail, or to set forth, except in shorthand, the objections which have been taken to them, and the replies which have been made to the objections. We must content ourselves with the 'heads' of both. The panegyrists of M. Zola say that convention had reigned long enough in literature; that it was time for an uncompromising and scientific view of human nature to take the place of superficial observation and romantic idealism; and that M. Zola has heralded and led this transformation with extraordinary vigour and skill. The adversary has urged from the beginning (and, while fully admitting the immense industry and remarkable power of the novelist, continues to urge) that his whole conception of art and nature is radically wrong. It is pointed out that M. Zola in the first place seems to confine his attention, by preference and deliberation, to sides of human nature which, though admittedly existent, are intermittent and exceptional; that where he attempts other sides, as in *Le Rêve*, he is more conventional and unreal than the most *clair-de-lune* sentimentalist; that he has no notion or grasp of human nature as a whole. It is further urged that his attempt to turn the encyclopædia into a novel, and to load his books with technical information, leads occasionally to blunders which do not very much matter, and constantly to a stiff and inartistic presentment which matters very much. It is said (to take two instances out of many) that the horticulture in that very moving and passionate book *La Faute de l'Abbé Mouret* is an intolerable bore; and that in its twenty years' younger brother, *La Debâcle*, the masterly demonstration of the faults of the French army is hindered, not helped, by the over-minuteness of the accounts of marches and bivouacs, while in certain other instances, which it is not necessary to specify, the superfluous matter is not only dull, but utterly disgusting. M. Zola is undoubtedly a strong man, who has not yet run his full race, and it is perhaps too soon to give or refuse him the crown. But if the opinion of the present writer is asked for, or has any value, it is that he has hopelessly mistaken the course, has gone on the wrong side of the flags, and must almost certainly be disqualified at the finish.

Zollikofer, Georg Joachim, a famous pulpit orator, born at St Gall in Switzerland, 5th August 1730, became preacher at Murten in 1754, at Leipzig in 1758, and died there, 25th January 1788. His sermons fill fifteen volumes (1789–1804). See the studies by Garve (1788) and Claudius (1783).

Zollverein (Ger., 'customs-union'), a union of the German states, under the leadership of Prussia, so as to enable them in their commercial relations with other countries to act as one state. When, after the war of liberation in 1815, the political union, destroyed by the downfall of 'the Holy Roman Empire,' had been restored to a certain degree in the German Confederation (see Germany, Vol. V. p. 182), internal commerce was felt to be trammelled and depressed by the collection of revenue at the frontiers of every petty state; and united action in regard to foreign commerce was impossible. The first suggestion of such a customs-union came from Prussia; but it took many years before an actual beginning was made, and still longer before it reached its ultimate extent, as the plan was opposed for a long time by the jealousies and special interests of many of the states. In 1834 eighteen states had entered a union for a term of eight years; in 1835–38 five more, in 1842–52 other five, including Baden, Brunswick, Frankfort, and Hanover. During the term 1854–65 all the German states were members except Austria, the two Mecklenburgs, and the Hanse towns. The events of the Austro-Prussian war disarranged the union. In 1867 a new customs-union was established between the North German Confederation and Bavaria, Würtemberg, Baden, and Hesse. But all such arrangements were rendered superfluous in 1871 by the constitution of the German empire.

Zomba, in the highlands of the Shiré (q.v.), seat of the British Imperial Commissioner.

Zombor, a royal free town of Hungary, capital of the district of Bacs, near the Franzen Canal, 42 miles NE. of Essek by rail. It has a brisk trade in grain and cattle. Pop. 24,693.

Zonaras, Joannes, a historian who flourished at Constantinople in the 12th century, was private secretary to Alexius I. Comnenus, and spent the last years of his life in the monastery of St Elijah at Mount Athos. His chief work, the *Chronicon*, is a poor compilation giving the history of the world from the creation to the death of Alexius in 1118. It was edited by Hieronymus Wolf (1557), Du Fresne (1686), Pinder (Bonn, 2 vols. 1841–44), and Dindorf (6 vols. 1868–75). Zonaras wrote also a commentary on the *Syntagma* of Photius, *scholia* to the New Testament, &c.

Zone System. See Railways, p. 561.

Zoogloea. See Bacteria.

Zooid. See Hydrozoa.

Zoological Gardens, London, familiarly known as the 'Zoo,' a triangular piece of ground about 20 or 21 acres in extent on the north side of the Regent's Park, containing one of the finest collections of animals in the world. The ground was first rented in 1828 by the Zoological Society, which was instituted two years previously. On 1st January 1892 the society had 2985 fellows, and the gardens, which during 1890 were visited by 640,987 persons, during 1891 by 598,730, had 2232 animals—630 mammals, 1346 birds, and 256 reptiles.

Zoology, the science of animal life, included along with Botany within the science of Biology. What has been said in the article Biology (q.v.) in regard to the place which the study of organisms occupies among other departments of knowledge, and in regard to the general evolution of the science, is entirely relevant in regard to zoology and need not be repeated here.

Departments of Zoological Study: (a) *Morphological.*—When we study the forms of animal life, or analyse these into their parts—e.g. organs, tissues, and cells; or arrange similar forms in groups—e.g. species, genus, family, order, and class, we are considering morphological or statical relations, the organism's actual life being left out of account. Anatomy and histology (or minute anatomy), the results of classification or taxonomy, so much of embryology as is occupied with the description of form and structure at successive stages in life-history, and of palæontology as is concerned with the structure of extinct animals must all be included under morphological zoology.

(b) *Physiological.*—When we study the habits of an animal; or analyse its activity into the

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functions of its parts—e.g. organs, tissues, and cells; or investigate the chemical changes of the living matter itself; or consider the life of the animal as one of a pair, family, or herd, or in its complex inter-relations with the associated fauna and flora, we are investigating dynamic or physiological relations. What is often popularly called 'natural history,' or, more technically, 'bionomics,' is concerned with the 'higher physiology' of animals, that is to say, with their life as intact individualities and as active parts of the complex systems of things which we call nature.

(c) *Historical.*—When we inquire into the fauna characteristic of successive geological ages and endeavour to trace the history of a class, order, or the like; or when we turn our attention to the development of individual animals, and seek to work out their life-history, we are pursuing studies technically described as palæontological and embryological respectively, but agreeing in this that they are both historical or 'genealogical.'

(d) *Ætiological.*—Finally, when we inquire into the conditions of organic change and progress, and endeavour to interpret either individual development (ontogeny) or racial history (phylogeny), our studies are ætiological. As a matter of fact these departments of zoology, though logically distinct, cannot be satisfactorily pursued apart from one another, and all the greater steps of zoological progress have been made by workers who combined the various inquiries. Of such all-round zoological work the best illustration is Charles Darwin. Ray Lankester distinguishes five branches of zoological study: (1) morphography, the work of the collector and systematist; (2) bionomics, the lore of the farmer, breeder, field-naturalist, &c.; (3) zoo-dynamics, zoo-physics, zoo-chemistry, the pursuit of the learned physician—anatomy and physiology; (4) plasmology, the study of the ultimate corpuscles of living matter; (5) philosophical zoology. This division, which introduces some unnecessary new terms, may be readily harmonised with that to which we adhere and which seems to be justified both by its logical clearness and by its correspondence with the great lines of progress in the past.

History.—The rudiments of zoology must be looked for in the ancient lore of the hunter, the fisherman, the shepherd, and the breeder, and much may also be gathered from researches into the history of words, art, and religious customs, but the science first took definite shape in the mind of Aristotle (384–322 B.C.). He seems to have known over 500 animals, and describes the structure and habits of some of these; he laid the foundations of comparative anatomy and taxonomy, and with remarkable insight discerned not a few important generalisations, such as the homology of organs. But the foundations which Aristotle so firmly laid remained for more than fifteen centuries almost unbuilt on, for Pliny (79 A.D.) was little more than an uncritical collector of current information, and Galen (200 A.D.), who dissected monkeys, was rather a human anatomist than a zoologist. It is true, however, that in various countries, and at various times onwards to the Renaissance, there were restless inquisitive spirits who were neither discouraged by the general lack of interest nor silenced by the frowns of the church. Many of these, however, were wont to cloak their zoological enthusiasm in mystical guise, and it is thus that we must interpret many of the allegorical works of mediæval times. Fact and fiction were strangely jumbled; credulity and superstition ran riot along the paths of science; and the long persistence of the *Physiologus* (see BESTIARY), with its series of fifty fanciful emblems, is typical of the prevalent mood of the dark ages.

The quickening of civilisation brought about by the Crusades, the discovery of new lands by travellers like Marco Polo and Columbus, the founding of universities and learned societies, the establishment of museums and botanic gardens, the invention of printing, the appearance of Aristotle's works in translation and dilution, and many other practical, emotional, and intellectual movements gave fresh force to science, as indeed to the whole life of man. Among the results of this scientific renaissance were the labours of the 'Encyclopædists'—such as the Englishman Edward Wotton (1492–1555), who wrote a treatise, *De Differentiis Animalium;* the Swiss Conrad Gesner (1516–65), author of a *Historia Animalium;* the Italian Aldrovandi (1522–1605); and John Johnston or Jonstonus (1603–75), a Polish Scot, the author of a dozen Latin folios on natural history. By their industry a large mass of facts was accumulated, but of too many it must be said that their intellectual appetite was greater than their powers of digestion, and the progress of science was in quantity more than in quality. About the middle of the 18th century the best aims of the 'Encyclopædists' were realised in Buffon's *Histoire Naturelle* (15 vols. 1749–67), a work which in spite of its wide range—for the author took all nature for his province—was full of acute perceptions and useful suggestions.

Instead of following further the chronological development of the science, it will be convenient to notice the great workers in the different departments, although this will necessitate a certain amount of multiple reference, some of the greatest zoologists having done equally important work along several lines.

I. *Morphological.*—In the hands of John Ray and Carl Linnæus the results of their own industry and the accumulations handed down from the Encyclopædists began to take the form of a definite taxonomy. It is an instructive study, for which there is no space here, to contrast the classification which may be inferred from Aristotle's works, and which persisted down to the time of Wotton and even afterwards, with that of Linné's *Systema Naturæ* (1st ed. 1735; 12th, 1768), in which six classes were recognised—Mammalia, Aves, Amphibia, Pisces, Insecta, and Vermes, and to follow the progress of taxonomy onwards. Lamarck drew the distinction between Vertebrates and Invertebrates with greater firmness than heretofore, and distinguished 'apathetic' animals (Infusoria, Polypi, Radiaria, Tunicata, Vermes), 'sensitive' animals (Insecta, Arachnida, Crustacea, Annelida, Cirripedia, Conchifera, and Mollusca), and 'intelligent' Vertebrata (Fishes, Reptiles, Birds, and Mammals). He was a firm believer in a *scala naturæ*, a regular series of increasing structural complexity, and though this was illusory he did much towards reducing the chaos in which he found Invertebrate animals. Cuvier, in his *Règne Animal* (1829), elaborated the idea of four great types or *embranchements*—Vertebrata, Mollusca, Articulata, and Radiata. This rapidly gave way before more careful anatomical analysis, as may be inferred from the early classifications of R. Leuckart, H. Milne-Edwards, and T. H. Huxley, which in turn were destined to be superseded as embryological and palæontological research came to the aid of anatomy, and as taxonomy began to be profoundly influenced by evolutionary conceptions. As a type of these modern or genealogical classifications we may refer to that of E. Ray Lankester, given in his article 'Zoology' in the *Encyclopædia Britannica.* See also the detailed classifications in the articles VERTEBRATA, &c. in this work.

Among those who have prosecuted the anatomical analysis of the animal body, revealing those

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homologies on which a sound comparative anatomy is based, Cuvier stands foremost. Meckel, Johannes Müller, Leuckart, Gegenbaur, and Dohrn among Germans; Milne-Edwards and Lacaze-Duthiers in France; Owen, Huxley, and Ray Lankester in England may be cited as representative of comparative anatomists. The analysis of organs into tissues which Bichât worked out in his *Anatomie Générale* has been followed out in great detail by zoologists, Leydig's *Histologie des Menschen und der Thiere* (Frankfurt, 1857) being a conspicuous example. The microscopic study of organisms which had been in progress since the days of Malpighi (1628–94), Swammerdam (1637–80), Hook (1635–1702), and especially Leeuwenhoek (1632–1723), led beyond tissues to the component cells, and in 1838–39 Schwann and Schleiden formulated their *Zellenlehre*, the elaboration and correction of which has been the chief task of modern comparative histologists (see CELL, EMBRYOLOGY, PROTOPLASM). This ultimate morphological analysis which leads to the study of the living matter itself has been aided by the perfecting of the Microscope (q.v.), and by the elaboration of histological technique—fixing, staining, imbedding, and microtome section-cutting.

II. *Physiological.*—If we disregard a few pioneers and isolated observations, such as Harvey's discovery of the circulation of the blood, we may associate Albrecht von Haller (1708–77) and John Hunter (1728–93) as the founders of physiology. They began to do for the functions of organs what Cuvier did for structure. Among the many illustrious zoologists who have continued their labours Johannes Müller (1801–58) is prominent, for to his own marvellous industry and to the impulse which he gave to his pupils (including many of the most famous living zoologists of Germany) we may refer much of what we know of comparative physiology—a department which has, however, lagged behind its counterpart in comparative anatomy.

Parallel to the morphological analysis from organ to cell was the gradual deepening of physiological study. Bichât's penetration beneath the functions of organs to the properties of tissues; the physiological study of cells by Schwann, Max Schultze, and many others; the experimental work of Claude Bernard, and his appreciation of the essential similarities of function in plants and animals, lead gradually to the modern study of protoplasmic metabolism (see PROTOPLASM), and to such inquiries as those of Krukenberg on the comparative physiology of animals or those of Metschnikoff on the functions of leucocytes.

III. (a) *Embryological.*—The study of individual development is the youngest department of zoological study, for although Harvey in 1651 sought to establish the fundamental fact *ovum est primordium commune omnibus animalibus*, and the true conception that organs arose by new formation (*epigenesis*) and not from the unfolding of some invisible preformation, the efforts of his prophetic genius were in great part futile, and the doctrines of the 'preformationists' persisted. Nor did immediate progress follow even when Wolff in 1759 ably reasserted Harvey's doctrine of epigenesis, for it was not till 1817 that Pander took up embryological work virtually where Wolff had left it. In fact it is from the work of Von Baer (1792–1876) that we must date the foundation of modern embryology, of which one of the most illustrious representatives was the late F. M. Balfour (see EMBRYOLOGY).

(b) *Palæontological.*—Although Leonardo da Vinci, Palissy, and others had discerned the true nature of fossils as remains of ancient life, and Woodward (1665–1722) had begun to collect and understand some of these, we need not hesitate to call Cuvier the founder of palæontology. To the fragmentary remains of the extinct he applied with signal success the principle of the 'correlation of parts,' and he was the first to begin that welding of palæontological and anatomical facts which has yielded such important results. Among continuators of his work have been Owen and Huxley in Britain, Quenstedt and Zittel in Germany, Gaudry in France, Marsh and Cope in America.

IV. *Ætiological.*—Apart from the philosophical speculations of Greek philosophers, a few ætiological suggestions found in the works of Aristotle, the evolutionary epic of Lucretius, and analogous endeavours towards an ætiology, the first serious interpretation of organic nature is that of Buffon. Buffon (1707–88), Erasmus Darwin (1731–1802), and Lamarck (1744–1829) may be called the three old masters in ætiology, and along with these we must associate Treviranus (1776–1837), Geoffroy St Hilaire, Goethe, and Oken. But the great master of them all was Charles Darwin, fellow-workers with whom have been Alfred Russel Wallace, Herbert Spencer, Ernst Haeckel, and Thomas H. Huxley. Of recent years most of the leading zoologists have contributed to the discussion of the problems of evolution, but the most prominent contributions are those of Weismann (q.v.).

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Zoophyte (Gr. *zōon*, 'an animal,' and *phyton*, 'a plant'), a term signifying animal-plant, employed by Cuvier in his earlier attempts at classification to designate numerous simple animals, sedentary in habit, often with a superficial resemblance to plants. As Cuvier used the term it was practically useless, for, like the title Radiata, in which it was afterwards incorporated, it was applied far too widely to have any precision. If now used it is restricted to hydroid colonies (see HYDROIDS). It would be more accurate if read backwards, *phytozoon*, or plant-like animal.

Zoospore. See SPORE.

Zorndorf, a Brandenburg village, 5 miles N. of Küstrin, where on 25th August 1758 Frederick the Great defeated the Russians in one of the bloodiest battles of the Seven Years' War (q.v.).

Zoroaster. Ζωροάστρης, or Ζαθραύστης (so the Greeks pronounced the name of Zarathushtra), the founder or reformer of the ancient religion of the Parsees, appears as a historical person only in the earliest portion of the Avesta, the Gâthic hymns, where the aspirations, hopes, and fears of an actual human agent are unmistakably present. His name means 'Bay-camels' (hardly 'Old-camels'), *ushtra* being a frequent termination, as in 'Fleet-camels,' Frashaoshtra. His father was Pourusaspa, 'Many-horses;' his wife was Hvogvi (i.e. of the Hvogvas); his daughter was Pouru-chista, the Discreet. His family name was Spitama. This much we may accept from the statement of documents, but as soon as we leave the last Gâtha, which was the wedding-song of his daughter, we have no reliable data. Whether he was born in Ragha, the 'Zarathushtrian' province (possibly later so called from its having become a political and ecclesiastical centre), or nearer the scene represented in the Vendîdâd (chap. i.), where countries to the east are mentioned (so more probably), or, again, whether Atropatene was his home, one thing seems certain, which is that all the persons named in the Gâthas belong beside him. Notwithstanding Yasna, xlvi. 1, with its 'to what land (district) shall I turn?' which probably gave rise to the erroneous opinion, he was no immigrant or emigrant going prophetically from country to country; for such a career at such an age would have been soon cut short by his execution. He is thoroughly at home and among his relatives in the Gâthas. As the centre of a group of chieftains, one of whom was the king Vîshtâspa ('Horse-owner'?), he was carrying on with varying success a political, military, and theological struggle for the defence or wider establishment of a holy agricultural state, whose laws and principles encouraged pastoral labour, tillage, and thrift, as against the freebooting tendencies of Turanian and Vedic aggressors. In the course of his career he composed religious-political hymns, the Gâthas, of which we have now only fragments surviving in metres which appear (or reappear) in the Ṛik and in other parts of the Veda. (See under ZEND also for the period in which he lived, which is even more uncertain than that of Homer, but which cannot be placed later than 800 B.C., and may be greatly earlier.) The later lives of Zaradusht are historically worthless, as are many fantastic particulars noted by the Greeks. See PARSEES.

Zosimus, a Greek historian, who held office at Constantinople under the Emperor Theodosius II. (408–450). His *Historia Nova*, a compilation mainly from earlier writers, is in six books; the first sketches the history of the Roman emperors from Augustus to 305 A.D., the other five deal more minutely with the period ending at 410. His style is concise, clear, and interesting. He seeks to unfold the causes of the decline of the empire, and, being himself a pagan, he adduces as the chief the neglect of paganism. The best editions are by Bekker (1837) and Mendelssohn (1887). —For Pope Zosimus (417–418), see PELAGIUS.

Zouaves, a body of troops in the French army, which derives its name from the Zwawa, a tribe of Kabyles in the Algerian province of Constantine. These Kabyles had long been employed as mercenaries by the deys of Algiers; and after the conquest in 1830 the French took them into their service. At first companies were formed consisting of French and Kabyles in certain proportions, officers,

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commingling the two races did not promote the comradeship intended, the French and Kabyles were formed into separate companies. Their first colonel was Lamoricière, under whom and his successor, Cavaignac, they distinguished themselves in many a bloody conflict with the Arabs of the south. Gradually however the native element was eliminated, and since 1840 the Zouaves may be considered as French troops in a quasi-Moorish dress. They now amount to upwards of 10,000 men, divided into four regiments of four battalions each. They are recruited from veterans of the ordinary infantry regiments who are distinguished for their fine physique and tried courage.

When the French and the African elements of the original Zouave battalions were separated, the Africans were constituted into a separate body, under the name of Algerian Tirailleurs, a force still recruited in Algiers to form a part (also four regiments) of the regular French army. They are usually spoken of as *Turcos*, and became too well known in the Franco-German war. In 1860 a corps of French soldiers was organised at Rome as Papal or Pontifical Zouaves, under Lamoricière, who were disbanded in 1871.

Zoutspansberg, a ridge of mountains (3000–4000 feet) in the north-east of the Transvaal, which is a continuation of the *Drakenberge* (q.v.).

Zschokke, JOHANN HEINRICH DANIEL, an eminent German writer, was born at Magdeburg, March 22, 1771. He ran away from school, was some time a strolling playwright, then a student at Frankfort, afterwards lectured there and adapted plays, set out on travels and finally opened a boarding-school at Reichenau in the Grisons. In 1798 he published his *Geschichte des Freistaats der drei Bünde in Rhätien*, then removed to Aarau, where he was employed as a commissioner to settle the affairs of Unterwalden, Uri, Schwyz, and Zug; later he was a member of the Great Council of Aargau. He died at Aarau, June 27, 1848. His books include histories of Bavaria and of Switzerland, and a long series of tales, among them *Der Creole*, *Alamontade*, *Jonathan Frock*, *Clementine*, *Oswald*, and *Meister Jordan*. The most popular of all his writings was the *Stunden der Andacht* (1809–16), translated as *Hours of Meditation and Reflection* (1843). This was a Sunday periodical, supplying a complete exposition of modern rationalism, with an eloquence and zeal for sound morality worthy of the best days of orthodoxy.

Zschokke's collected writings fill 35 vols. (1851–54). A few of his tales (*Goldmaker's Village*, *Lover's Stratagem*, *Veronica*, &c.) have been translated into English. See his *Selbstschau*, a kind of autobiography (1842; Eng. trans. 1847); also Lives by Emil Zschokke (3d ed. 1876) and Born (1886), and Keller's *Beiträge zur Politischen Thätigkeit H. Zschokkes 1798–1801* (Aarau, 1887).

Zschopau, a town of Saxony, 15 miles SE. of Chemnitz by rail. Pop. 7869.

Zuccaro, TADDEO (1529–66), painter, has left a number of pretentious but not valuable frescoes at Rome, and a few easel-pieces of no especial merit.—His younger brother, FEDERIGO (1543–1609), had some merit as a painter of portraits and other works in oil (he painted Queen Elizabeth, Mary Queen of Scots, &c. during a temporary exile), but gave most of his time to tasteless frescoes—he disfigured Florence cathedral with some 300 figures nearly 50 feet high and extravagant in attitude, which time, however, has mercifully done much to hide. Zuccaro decorated the Escorial for Philip II. of Spain, and founded at Rome in 1595 the Academy of St Luke, which

Zug, the smallest of the Swiss cantons, has an area of 92 sq. m. and a pop. (1888) of 23,123. The south-eastern part borders on the Alpine region, and is hilly and pastoral; the north-western part, enclosing a great part of the Lake of Zug, is a rich and beautiful country of cornfields and orchards. The inhabitants speak German, and are Catholics. —Zug, the picturesque mediæval capital, situated at the north-east end of the lake, 24½ miles off Zurich by rail, has a pop. (1888) of 5160. Many persons were killed here in July 1887 by the fall of about thirty houses into the lake.

Zuider Zee, a large gulf penetrating deep into the Netherlands, between 52° 26′ and 53° 20′ N. lat., about 60 miles in length, and 210 miles in circumference. The islands Texel, Vlieland, Ter Schelling, Ameland, and Schiermonnikoog, reaching in a chain from the most northern point of Holland, are the remains of the former line of coast, which form a breakwater against the North Sea. From Dunkirk in French Flanders to the north of Holland the interior is defended from the sea by sandhills or dunes. Here, as at the mouth of the Scheldt, the sand-barrier was broken, and in 1282 the waters overflowing the low lands separated the province of Friesland from the peninsula of North Holland, and, having united with the small inner lake Flevo, formed the present Zuider Zee. In it lie the islands Wieringen, Urk, Schokland, and Marken, with a pop. of about 5000. From the south-east of the Zuider Zee a long narrow arm, called the Y (pronounced *I*), formerly ran nearly due west, through the peninsula of Holland. A strong sea-dyke and locks have been constructed to cut off the Zuider Zee from the Y, through which a broad ship-canal (see CANAL, fig. 5) has been made between Amsterdam and the North Sea. On both sides of the new canal the Y has been drained and turned into about 12,000 acres of rich land. The new waterway was formally opened by the king in 1876. A drainage scheme, which a state commission was appointed in 1892 to consider, proposes to drain the Zee and reclaim over 1,350,000 acres at an estimated cost of nearly £10,000,000. See HOLLAND; and Havard, *Dead Cities of the Zuyder Zee* (trans. 1876).

Zulus (*Amazulus*), a branch of the great Bantu (q.v.) division of the human family, among whose sections the aggregate of tribes or clans now generally known as the Zulus are conspicuous for their physical and intellectual development. By nature the men are brave and are given to field sports, and, where opportunity offers, to border forays and intertribal strife. A noticeable feature in their nature is that when a fight is definitely over (bitterly and bravely as it usually is fought) no passions appear to remain, nor are feelings of revenge harboured against each other. The Zulu polity is that of a pure democracy, the chiefs being elected, and holding office during the pleasure of the people. This pleasure is given expression to through parents to subheads of districts, through them to the heads of larger districts, and through these in turn to the chief direct. Legislation occurs in the same way, through an expression of feeling from the body of the people to the chief through the heads of districts. A very complete, though unwritten, code of law, civil and criminal, exists and is well known to every adult Zulu. Polygamy is practised throughout the country, and has been from time immemorial; the marriage-tie, however, with the tenth or twentieth wife is as sacred as where monogamy prevails. As a race the Zulus are conspicuous for their morality and freedom from drunkenness and crime. Missionary efforts to

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Christianise have been more tolerated and acquiesced in than successful. The pursuits of the people are pastoral. Trading is little known, and the arts are limited to the primitive needs of simple iron-work, pottery, and ornaments of copper, ivory, horn, or wood.

In the beginning of the 19th century the Zulus proper were a small clan who, responding to the ambition of the warlike chieftain Tshaka, became embroiled with most of the neighbouring tribes, with the result that one hundred or more clans, once considered as strong as the Zulu clan, were attacked in detail and compelled to acknowledge fealty to the Zulu clan proper. Tshaka during the first quarter of the century dominated South Africa practically from the Zambesi to the Cape Colony, and this as conclusively and successfully and by much the same methods as Napoleon dominated Europe for the time. Subsequent to this date the Zulus became restricted in this dominion by the advent of pioneer Europeans in the Cape Colony and the Dutch republics and Natal. Tshaka was succeeded in 1828 by his brother Dingaan, who was assassinated for political reasons. He in turn was succeeded by Umpanda, who reigned over a third of a century, dying in 1873. He left as his successor Cetewayo, who reigned from 1874 until 1878 as paramount chief over a Zululand which included not only the Zululand of to-day, but a large portion of what is now within the borders of the Transvaal and Amatongaland. In 1878 Sir Bartle Frere, the then High Commissioner for South Africa, assumed the policy that British interests in the territories bordering on Zululand were threatened by the existence of the independent nation occupying that country. Acting on this policy, he, in opposition to the views held by Sir Henry Bulwer and other officers of the crown in South Africa, sent on the 11th December 1878 an ultimatum to Cetewayo, which was of a nature to create war between the Zulus and the British. War being declared, active steps were taken to invade and subjugate Zululand. General the Hon. F. A. Thesiger (Lord Chelmsford) was detailed to conduct the military operations. Five columns were thrown into the country, but owing to mismanagement they all proved unsuccessful, the main one being almost annihilated by the Zulus at Isandula (q.v.) on January 22, 1879. The gloom of this fearful disaster was slightly relieved by the heroic and historic defence of Rorke's Drift (q.v.). The other columns, after a series of small battles, in which any measure of success was to a large extent attained by the colonial volunteers attached to them, recoiled on their bases, and were either shut up at Etshowe or ordered back to the British side of the Tugela River. Reinforcements were hurried forward from England, and the command of the military operations was handed to General Sir Garnet Wolseley. He arrived in Natal with the latter portion of the reinforcements; but Lord Chelmsford meanwhile had on the 4th July won a decisive battle at Ulundi. The result of the engagement was that the Zulus admitted themselves beaten, gave up the contest, and claimed the position of conquered and the protection of the conquerors. England, however, was opposed at the moment to the policy of annexation, and declined to take over the country despite the wish of the subjugated people. The home authorities appointed thirteen chiefs to reign where only one had previously ruled, with the result that anarchy and internecine strife ensued. In 1884, in which year Cetewayo died, England was again asked to exercise sovereign rights in the country, and so pacify it. This the government declined to do, and a party of Boer adventurers from the Transvaal entered the country and took sides with the combatants, succeeding ultimately in obtaining for the Transvaal the best portion of Zululand. The remainder has since 1887 been annexed to England under the title of British Zululand. It is governed by the governor of Natal through local officials, who collect the revenues and administer the laws—the latter being the ordinary Zulu laws shorn of customs repugnant to civilised methods of government. The resident commissioner lives at Etshowe or Ekowe.

See Thomas B. Jenkinson, *Amazulu* (1882); Lady F. Dixie, *In the Land of Misfortune* (1882); Frances E. Colenso, *Ruin of Zululand* (2 vols. 1884–85); Rev. Josiah Tyler, *Forty Years among the Zulus* (1892).

Zumala-Carreguy, TOMAS, the greatest of the generals of Don Carlos during the civil war of 1833–40, was born in 1789 at Ormaiztegua, in the Biscayan province of Guipuzcoa. He left his studies at Pampeluna to fight under Mina against Napoleon, and afterwards served under Quesada in the 'Army of the Faith;' and on the re-establishment of absolutism he was raised to the rank of colonel, and appointed governor of Ferrol. For his leaning to the party of the Carlists he was tried by court-martial but acquitted; in 1832 with other Carlists he was dismissed the army. But in 1833 the rising of the Basque population called him to head the Carlist insurrection. His motley army was without uniform, ill-fed, and ill-paid, yet the vigour and personality of 'el Tio Tomas' were such that he was able to maintain effective discipline. He kept his opponents at bay, defeated Rodil in the valley of Amescoas, routed another force of Christinos at Viana, gained a second victory in the Amescoas valley, completely defeating Valdez, after a battle of four days, and routed Iriarte near Guernica. These brilliant successes turned the weak head of Don Carlos, and led him to interfere with the plans of his daring and devoted general, who was anxious to strike for Madrid when the Christinos were paralysed with terror. Zumala-Carreguy was ordered to lay siege to Bilbao, but was mortally wounded by a musket-ball, and died ten days later, June 15, 1835. See CARLISTS; Henningsen's *Twelve Months' Campaign* (1836), and the *Cornhill Magazine* for January 1871.

Zumbo. See ZAMBESI.

Zumpt, KARL, philologist, was born at Berlin, 20th March 1792, studied at Heidelberg and Berlin, and after holding posts in various higher schools became in 1827 extra-ordinary, in 1836 ordinary professor at the university, and died 25th June 1849. His best-known work is the *Lateinische Grammatik* (1818; 13th ed. by A. W. Zumpt, 1874); also his editions of Curtius (1826 and 1849), Quintilian (1831), Cicero's *Verrine Orations* (1830; and Commentary, 1831), and *De Officiis* (1837).

He wrote books on the Roman knights (1839), the numbers of the population in ancient states (1841), the philosophical schools of Athens (1843), the Roman dwelling-houses (1844), Roman Religion (1845), and the legal standing of the Roman citizen (1846).

His nephew, AUGUST ZUMPT, also a distinguished philologist, was born at Königsberg, 4th December 1815, studied at Berlin, lectured in gymnasia there, and died 22d April 1877. He devoted himself especially to Latin epigraphy, and by his studies therein threw great light upon Roman antiquities. See the Life by Padalletti (1878).

Zungaria (Dzungaria, Tsungaria, or Simgaria), the country of the Zungars, a people belonging to the Kalmuck or western Mongolian stock, a race no longer existing as a separate people. Lying between the central Tian-shan highlands of the Russo-Chinese frontier and the western Altai, it is a high mountain region, in which are the sources of the Black Irtish and the Ili. The Chinese have lately

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recovered their hold in Zungaria, including Kulja (q.v.). The population includes Dungans or Tungans, Chinese, Kalmucks, and Kirghiz.

Zurbaran, Francisco (1598–1662), Spanish painter, was born the son of a labourer in Estremadura, who perceived his talent and got him into a studio at Seville. There he spent most of his life, studious and laborious; his subjects are mostly of a religious nature, and he had a wonderful skill in such white draperies as those of the Carthusian monks. His masterpiece, an altarpiece with many noble figures, is in the museum at Seville, and in St Paul's Church there a famous Crucifixion is preserved. The London National Gallery has a fine kneeling Franciscan holding a skull.

Zurich (Ger. *Zürich*), a northern canton of Switzerland, drained by the Rhine and its tributaries, and traversed from NW. to SE. by ridges of lofty hills, between which lie three valleys, forming almost its whole surface—those of the Toss, the Glatt, and the Limmat. The last drains the beautiful Lake of Zurich, which, lying 1341 feet above sea-level, is 25 miles long, and 2½ miles broad at the widest. Zurich has not a fertile soil, but it is carefully cultivated. Zurich was one of the earliest seats of the cotton manufacture in Europe, and the spinning and weaving of cotton are still prosecuted with great success. The silk industry is nearly as important; and machinery, bells, type, paper, &c. are also manufactured. Area, 666 sq. m. Pop., German-speaking and Protestant, (1870) 284,786; (1888) 339,014.

Zurich, the capital, 41 miles by rail NNE. of Lucerne and 43 NW. of Glarus, is situated at the point where the Limmat issues from the Lake of Zurich and unites with its tributary the Sihl. It is one of the most prosperous manufacturing and commercial towns of Switzerland; yet the narrow streets and lofty houses of its older quarters, on the high ground east of the river, give it the quaint appearance of a mediæval city. Of the Romanesque cathedral, erected in the 11th and 13th centuries, Zwingli was pastor, as Lavater was of the Peterskirche. The Polytechnic (1864) houses the university, which, founded in 1832, has nearly 100 teachers and more than 500 students; and one may also notice the town-hall (1699), the botanic gardens, the six bridges, and the town library with over 100,000 volumes and 3000 MSS. Fuseli was a native. Pop. (1870) 56,695; (1888) 90,008 (27,664 in the town proper).

Zutphen, a town in the Dutch province of Guelderland, on the Yssel, here joined by the Berkel, 18 miles NNE. of Arnhem by rail. Of buildings the chief are the Great Church (1103; restored 1857) and the 'Wijn Huis' tower. At Rysselt, 3 miles N., is the boys' reformatory of 'Nederlandsch Mettray' (1851). Zutphen has manufactures of paper, oil, leather, &c. It has been several times besieged; and in a skirmish on the field of Warnsfeld, a little to the east, Sir Philip Sidney (q.v.) received his death-wound from a Spanish bullet, 2d October 1586. Pop. 17,004.

Zuyder Zee. See Zuider Zee.

Zvenigorodka, a Russian town 100 miles S. of Kieff; pop. 11,350.

Zvornik, a fortified town of Bosnia, which the Austrians occupied in 1878 only after severe fighting, situated on the left bank of the Drina, about 60 miles NE. of Bosna-Serai. Pop. 3030.

Zweibrücken (Fr. *Deux-ponts*), an ancient county, from 1410 a duchy, now incorporated in the Bavarian Palatinate. Its old capital, Zweibrücken (Lat. *Bipontinum*), 45 miles by rail W. of Landau, has a large castle (now a court-house), many busy manufactories, and is notable for its Bipontine edition of the classics, beautifully printed at the ducal press from 1779. Pop. 10,534.

Zwickau, a picturesque city of Saxony, irregularly built in its older portions, in a pleasant valley on the left bank of the Mulde, 82 miles by rail SW. of Dresden. Of its churches the most noteworthy is the Gothic Marienkirche, which dates from 1451, was restored in 1839–42, and has a tower 285 feet high. The old castle has been converted into a prison. The town carries on many manufactures; but the chief source of its wealth is the rich beds of coal in the surrounding district, which employ 8000 miners. Pop. (1890) 43,941.—For the Prophets of Zwickau, see Anabaptists.

Zwingli, Huldreich (Latinised *Ulricus Zuinglius*), the Swiss Reformer, was born at Wildhaus, at the head of the Toggenburg valley, canton of St Gall, January 1, 1484. He made his studies in philosophy and humanity at Bern and Vienna, in theology at Basel under Thomas Wyttenbach, and was appointed pastor at Glarus in 1506. Here he devoted himself to study and taught himself Greek, learning by heart the epistles of St Paul. At that time the Swiss hired out their soldiers to foreign states, and Zwingli twice (1512 and 1515) accompanied the men of Glarus as field-chaplain. In 1516 he was transferred to Einsiedeln, then as now a great resort of pilgrims to the shrine of the Black Virgin. Zwingli made no secret of his contempt for the superstition of such pilgrimages, and all the papal promises of promotion failed to purchase his silence. In December 1518 he was elected to be preacher in the minster at Zurich, and one of his first duties was to rouse the council not to admit within the city gates Bernhardin Samson, who had been selling indulgences throughout the Forest Cantons. He now began to preach plain gospel truth with greater boldness than ever, and his influence grew rapidly. In 1521 he succeeded in keeping Zurich from joining the other cantons in their alliance with France—'it is no sin to eat flesh on a fast-day,' said the fearless patriot-preacher, 'but it is a great sin to sell human flesh for the slaughter.' The Bishop of Constance now sent his vicar-general to Zurich, but he was quickly silenced in debate by the Reformer (January 29, 1523), in presence of the council and six hundred men. His utter discomfiture was followed by the formal adoption by the city of the Reformed doctrines as set forth in Zwingli's sixty-seven theses. A second disputation followed in presence of nine hundred (October 26–29, 1523), with the result that images and the mass were swept away. Zwingli married Anna Meyer (*née* Reinhard), a widow of forty-three, in 1524; on Easter 1525 he dispensed the sacrament in both kinds to his congregation. Meantime the movement spread widely over Switzerland. Bern followed in 1528 after the triumphant disputation in January, then Basel, St Gall, Schaffhausen. The Anabaptists troubled the Swiss reformation (1523–26), while the great controversy with Luther, which was to rend the Protestant church, began and grew to its height. Zwingli first made public his views on the Lord's Supper (q.v.) in his famous letter to Matthaus Alber (November 16, 1524), and the first stage of the controversy closed with the fruitless conference at Marburg, brought about by Philip the Magnanimous, in October 1529. On the one side were Luther, Jonas, Melanchthon, Osiander, Stephanas Agricola, and Brenz; on the other, Zwingli, Œcolampadius, Bucer, and Hedio. Luther insisted upon identity in doctrine being necessary amongst brethren, and his refusal to give the right hand of fellowship to Zwingli made

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the latter burst into tears. Of the fifteen articles prepared by Luther, there was absolute agreement on the first fourteen, and even two-thirds of the fifteenth. In his view of this last question Zwingli rejects every form of local or corporeal presence, whether by transubstantiation, impanation, or consubstantiation. He assails every form, however subtle, of the old *Capernaitic* (John, vi. 51–53, 59) conception of a carnal presence and carnal appropriation. He took his stand upon John, vi. 63, 'The flesh profiteth nothing;' but Luther wrote with chalk on the table before him, 'This is my body,' as the truth of God which nothing could explain away.

Meantime the progress of the Reformation had only aroused bitter hatred in the Forest Cantons, which foresaw the end of the traditional political importance they enjoyed in the diet. Zwingli divined that the political and religious questions could not be separated, but failed to bring the Protestant cantons to see the real nature of the crisis. Five Roman Catholic cantons formed in November 1528 a separate alliance, to which the Archduke Ferdinand of Austria was admitted a few months later. Zurich declared war in 1529 on account of the burning alive of a Protestant pastor seized on neutral territory, but bloodshed was averted for a time by the first treaty of Cappel, June 25, 1529. The Zurichers' fears were lulled into a fancied security, and Bern's jealousy of Zurich hindered co-operation, while the Forest Cantons and Zug stealthily made their preparations. At length they made a sudden dash on Zurich with a force of 8000 men, and were met at Cappel by an ill-prepared and ill-provided force of but 2000 men. The men of Zurich made a desperate resistance, but were completely defeated, and among the dead lay the great Reformer, Oct. 11, 1531. 'They may kill the body but not the soul' were his last words.

Zwingli's religious convictions came to him independently of Luther, for he was preaching substantially the Reformed doctrines as early as 1516, the year before the appearance of Luther's theses. He never had the inward struggle of Luther and Calvin, for he started from a different point from them, finding his way by degrees from Humanism to positive truth as the meaning of Scripture deepened in his mind. The inward sphere of the self-consciousness as renewed by God, in which man knows himself to be a child of God, was the region in which Luther's religious speculation lingered; Zwingli, on the other hand, emphasised the necessity laid upon man to carry out God's glory on earth by fulfilment of His will. Hence his patriotism, which sprang naturally from this religious root, and his un-Luther-like zeal for reform in the formal worship and constitution of the church, and his repudiation of everything not expressly enjoined in Scripture. Original sin he regarded as a moral disease (*morbus*), or natural defect, rather than as punishable sin (*peccatum*) or guilt. The latter term was limited to actual personal violation of God's law, but was not applicable to the natural depravity of man, itself the source of such violation. He was the first to maintain the salvation of unbaptised infants, and he believed, moreover, in the salvation of such virtuous heathens as Socrates, Plato, Pindar, Numa, Scipio, and Seneca. With regard to the universal fore-ordination and efficacious providence of God, and in regard to reprobation and election, Zwingli was as Calvinistic as Calvin or Augustine himself. As a man he was calm, intrepid, incorruptible, without the fire and genius of Luther, but with a sounder understanding and better balance of faculties. The most open-minded and liberal amongst the Reformers, he grasped the conception of a broad Christian union, beyond unessential differences in doctrine and ritual, to which it can hardly be said the Christian church has yet attained. He had no faculty for metaphysical speculation, and his four dogmatic works are terse and clear beyond most writings of their class: the Sixty-seven Articles of Zurich (1523), the Ten Theses of Bern (1528), the Confession of Faith to the German Emperor Charles V. (1530), and the Exposition of the Christian Faith to King Francis I. of France (1531)—his 'swan-song,' as Bullinger calls it, written but three months before his death.

Zwingli's *Opera* fill four folio volumes, ed. by Gualther, his son-in-law (1545). Later editions are by M. Schuler and J. Schulthess (8 vols. 1828–42; supp. 1861). A good selection in German is that by Christoffel in 11 small volumes (1843–46). The chief is the *Commentarius de vera et falsa religione* (1525); the rest are mainly occupied with the exposition of Scripture and the controversies with the Papists, the 'Catabaptists,' and on the Eucharist. There are Lives by Oswald Myconius (1532; reprinted by Neander in *Vitæ quatuor Reform.* 1841), Heinrich Bullinger (ed. by Hottinger and Vögeli, 3 vols. 1838), J. M. Schuler (1819), Sal. Hess (1819), J. J. Hottinger (1841; Eng. trans. 1856), R. Christoffel (1857; Eng. trans. 1858), J. C. Mörikoffer (1867–69), G. A. Hoff (1882), and Usteri (1883). For his theology, see the books by Zeller (1853), Sigwart (1855), H. Spörri (1866), Marthaler (1873), A. Baur (1885–89); Dorner's *Hist. of Prot. Theology* (Eng. trans. 2 vols. 1871), Principal Cunningham's *Reformers and the Theology of the Reformation* (1862); and for the great Eucharist controversy, A. Ebrard, *Das Dogma vom heil. Abendmahl und seine Geschichte* (1846).

Zwittau, a town in the extreme north of Moravia, 40 miles N. of Brunn by rail. Pop. 6351.

Zwolle, capital of the Dutch province of Overyssel, on the Zwarte Water, at the junction of several railways, 50 miles E. by N. of Amsterdam. Besides a busy transit trade it has foundries, shipyards, &c. Close by is Agnetenberg, in whose monastery Thomas à Kempis lived and died. Pop. (1889) 25,914.

Zygophyllaceæ, a natural order containing about a hundred species of herbaceous plants, shrubs, and trees, chiefly natives of subtropical countries. The most important genus is Guaiacum (q.v.). The abundance of species of Zygophyllum and some other genera constitutes a most striking feature of North African and Arabian deserts. The flowers of *Z. fabago* are employed as a substitute for capers, under the name of *Bean-capers.*

Zymose. See FERMENTATION.

Zymotic (Gr. *zymē*, 'leaven;' *zymosis*, 'fermentation'), a term for diseases caused by the multiplication of a living Germ (q.v.) introduced from without into the body. See DISEASES.

Zyrianovsk, a mining town in a rich silver-producing district of Semipalatinsk, near the southern frontier of Siberia, lies among the slopes of the Altai Mountains, on a head-stream of the Irtish; pop. 4500. The Zyrians of the neighbourhood, a tribe of the Altai Tartars, are Shamanists, and live by hunting in the forests.

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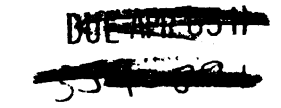

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